90277R01
VOLUME VI-H
ORIGINAL

2

PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

U.S. ARMY MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

STUDY AREA EVALUATIONS
VOLUME VI-H
NORTH PLANTS STUDY AREA
EXPOSURE ASSESSMENT
VERSION 4.1

SEPTEMBER 1990
CONTRACT NO. DAAA15-88-D-0024
RIFS2

EBASCO SERVICES INCORPORATED
Applied Environmental, Inc.
CH2M HILL DataChem, Inc.
R. L. Stollar & Associates, Inc.

REQUESTS FOR COPIES OF THIS DOCUMENT
SHOULD BE REFERRED TO THE PROGRAM MANAGER
FOR ROCKY MOUNTAIN ARSENAL
AMXRM-PM COMMERCE CITY, CO 80022

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	09/00/90	

4. TITLE AND SUBTITLE
HUMAN HEALTH EXPOSURE ASSESSMENT FOR ROCKY MOUNTAIN ARSENAL, FINAL, VERSION 4.1

5. FUNDING NUMBERS
DAAA15 88 D 0024

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
EBASCO SERVICES, INC.

8. PERFORMING ORGANIZATION REPORT NUMBER
90277R01

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
ROCKY MOUNTAIN ARSENAL (CO.). PMRMA

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

THE OBJECTIVES OF THE HUMAN HEALTH EXPOSURE ASSESSMENT INCLUDE:

1. ESTIMATE THE TYPE AND MAGNITUDE OF EXPOSURES TO CONTAMINANTS
2. IDENTIFY CONTAMINANTS OF CONCERN
3. IDENTIFY SITES FOR REMEDIAL ACTION
4. RECOMMEND SITES FOR THE NO ACTION REMEDIAL ALTERNATIVE
5. PROVIDE A BASIS FOR DETAILED CHARACTERIZATION OF THE RISK ASSOCIATED WITH ALL SITES.

THIS DOCUMENT CONSISTS OF THE FOLLOWING: AN EXCUTIVE SUMMARY. VOL.I - LAND USE AND EXPOSED POPULATION EVALUATIONS. VOL.II & III - TOXICITY ASSESSMENT (INCLUDES ARMY AND SHELL TOXICITY PROFILES). VOL. IV - PPLV METHODOLOGY. VOL. V - PPLV CALCULATIONS. VOL. VI - STUDY AREA EXPOSURE ANALYSIS (A INTRODUCTION, B WESTERN STUDY AREA, C SOUTHERN STUDY AREA, D NORTHERN CENTRAL STUDY AREA, E CENTRAL STUDY AREA, F EASTERN STUDY AREA, G SOUTH PLANTS STUDY AREA, AND H NORTH PLANTS STUDY AREA. VOL. VII - SUMMARY EXPOSURE ASSESSMENT. VOL. VIII -

14. SUBJECT TERMS	15. NUMBER OF PAGES
PPLV, LAND USE, SOIL, WATER, BIOTA	
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED			

90277R01
VOLUME VI-H
ORIGINAL

TECHNICAL SUPPORT FOR
ROCKY MOUNTAIN ARSENAL

FINAL
HUMAN HEALTH EXPOSURE ASSESSMENT FOR ROCKY MOUNTAIN ARSENAL

STUDY AREA EVALUATIONS
VOLUME VI-H
NORTH PLANTS STUDY AREA
EXPOSURE ASSESSMENT
VERSION 4.1

SEPTEMBER 1990
CONTRACT NO. DAAA15-88-D-0024
RIFS2

Prepared by:

EBASCO SERVICES INCORPORATED
Applied Environmental, Inc.
CH2M HILL
DataChem, Inc.
R.L. Stollar and Associates

Prepared for:

U.S. ARMY PROGRAM MANAGER'S OFFICE
FOR THE ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

2.0 SITE-BY-SITE EXPOSURE ASSESSMENT

2.1 SITE NPSA-1: CHEMICAL SEWER SYSTEM (formerly North Plants Complex;

LIST OF TABLES (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF ACRONYMS

CAR	Contamination Assessment Report
COC	contaminant of concern
COS	contaminant of significance
CRL	certified reporting limit
d	depth to the top of the contamination zone
EI	Exposure Index
GB	Sarin
ICP	Inductively Coupled Plasma
ISCLT	Industrial Source Complex Long Term Plume Dispersion
NPSA	North Plants Study Area
PPLV	preliminary pollutant limit value
RI	remedial investigation
RMA	Rocky Mountain Arsenal
RMACCPMT	Rocky Mountain Arsenal Contamination Control Program Management Team
SAR	Study Area Report
SPPPLV	single pathway preliminary pollutant limit value
VEI	vapor exposure index

EXECUTIVE SUMMARY

The North Plants Study Area (NPSA) Exposure Assessment presents detailed exposure analyses for the 16 potentially contaminated areas defined by the North Plants Study Area Report (SAR). The evaluations were based on the soil and sediment contaminant concentrations presented in the site-specific Contamination Assessment Reports (CARs) and the overall SARs and groundwater contaminants from DP Associates Groundwater Database. The maximum concentrations for each contaminant detected were extracted from these data and reported. Draft preliminary pollutant limit values (PPLVs) were computed for each of these site-specific contaminants as described in Volume IV of the Exposure Assessment Report for the direct (soil ingestion, suspended particulate inhalation, and dermal contact) and indirect (open and enclosed space vapor inhalation) exposure pathways. Cumulative PPLVs were computed for the five exposed populations (regulated visitors, casual visitors, recreational visitors, commercial workers, and industrial workers). The site-by-site evaluations consisted of comparisons of the maximum site contaminant concentrations to their corresponding cumulative Draft PPLVs in order to determine exceedances and, hence, established a first screen for determining sites which may be considered as candidates for remedial action during the Feasibility Study. These are ranked into two categories: Priority 1 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations exceed the draft human health based criteria, and Priority 2 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations do not exceed the draft human health based criteria. Site designations will be reconsidered throughout the Endangerment Assessment process as health based criteria are refined and additional data become available.

No samples from the interior of sewer lines present in the NPSA were included in the analysis since these evaluations are based on soil contaminants only. Sewers are being considered for remedial action under the ongoing Feasibility Study.

A groundwater plume has been identified in the NPSA. Therefore, in addition to the direct soil exposure evaluations, the significance of the inhalation of volatile groundwater

contaminants which diffuse through site soils was estimated using the open space and enclosed space vapor inhalation models as described in detail in Volume IV (Sections 4.5 and 4.6, respectively) and the exposure analysis procedures presented in Volume VI-A. The exposure evaluations were performed for the most sensitive exposed population (i.e., the industrial worker).

Of the 16 sites evaluated in the NPSA, 10 were designated Priority 1 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Chemical Sewer System (NPSA-1)
- Tank Farm (NPSA-2)
- GB Manufacturing Area (NPSA-3)
- Fuze and Detonator Magazine (NPSA-4)
- Special Weapons Plant (NPSA-5)
- Underground Spill Area (NPSA-6)
- Drainage Ditch (NPSA-8c)
- Chromium Detection (NPSA-9b)
- Benzene and Zinc Detections (NPSA-9d)
- Arsenic Detection (NPSA-9f)

The remaining 6 sites were designated as Priority 2 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Surface Spill Area (NPSA-7)
- Drainage Ditch (NPSA-8a)
- Drainage Ditch (NPSA-8b)
- Railroad Tracks (NPSA-9a)
- Zinc Detection (NPSA-9c)
- Railroad Tracks (NPSA-9e)

The contaminants of concern (COCs) in soils (i.e., those displaying cumulative exposure indices (EIs) greater than 0.1) for the NPSA, based on the most sensitive exposed population PPLV (i.e., the industrial worker), are:

- Aldrin
- Benzene
- Chloroacetic acid
- Chloroform
- Dieldrin
- Tetrachloroethylene
- Arsenic
- Cadmium
- Chromium

The contaminants of significance (COSs) in groundwater (i.e., those displaying vapor exposure indices (VEIs) greater than 1) for the NPSA are:

- Carbon tetrachloride
- 1,1-Dichloroethylene

1.0 INTRODUCTION

The analyses and evaluations performed under the Rocky Mountain Arsenal (RMA) Exposure Assessment are documented in eight report volumes. These include Volume I, Surface Use and Exposed Population Evaluations; Volumes II and III, Toxicity Assessment; Volumes IV and V, Preliminary Pollutant Limit Value (PPLV) Methodology; Volume VI, Study Area Exposure Assessments; Volume VII, Summary Exposure Assessment; and Volume VIII, Response to Comments on the Draft Exposure Assessment.

Volume VI of the Exposure Assessment is a detailed presentation of the study area exposure analyses, consisting of site-by-site comparisons of measured maximum contaminant concentrations to their Draft PPLVs derived for an industrial worker (the most sensitive receptor). Volume VI consists of eight subvolumes, VI-A through VI-H. Subvolume H (this document) constitutes the Study Area Exposure Assessment for the North Plants Study Area (NPSA). The remaining subvolumes are: VI-A, Introduction; VI-B, Western Study Area; VI-C, Southern Study Area; VI-D, North Central Study Area; VI-E, Central Study Area; VI-F, Eastern Study Area; and VI-G, South Plants Study Area. A description of the contents, approach, specific procedures, and format in preparing the Study Area Exposure Assessment documents is presented in Volume VI-A.

The exposure assessment for the NPSA was performed on a site-by-site basis. The site designations are consistent with those used in the remedial investigation (RI) Study Area Report (SAR) for the NPSA (EBASCO, 1989a/RIC 89166R05). The analytical data used for each site were based on the original Rocky Mountain Arsenal Contamination Control Program Management Team (RMACCPMT)/Phase I and II RI site Contamination Assessment Reports (CARs). Additional information on the history of these sites can be found in Section 3.2 of the SAR (EBASCO, 1989a/RIC 89166RO5). The SARs present a regional overview of the extent of contamination and migration characteristics throughout the Arsenal. An analogous regional overview of the exposure assessment for the NPSA is presented in the Study Area Exposure Summary, Section 3.0 of this report volume. This regional summary is integrated with the other study area exposure summaries in

Volume VII to provide an Arsenal-wide perspective of the significance of the measured contamination.

The sites included in the North Plants Exposure Assessment are as follows:

- NPSA-1: Chemical Sewer System
- NPSA-2: Tank Farm
- NPSA-3: GB Manufacturing Area
- NPSA-4: Fuze and Detonator Magazine
- NPSA-5: Special Weapons Plant
- NPSA-6: Underground Spill Area
- NPSA-7: Surface Spill Area
- NPSA-8a: Drainage Ditch
- NPSA-8b: Drainage Ditch
- NPSA-8c: Drainage Ditch
- NPSA-9a: Railroad Tracks
- NPSA-9b: Chromium Detection
- NPSA-9c: Zinc Detection
- NPSA-9d: Benzene and Zinc Detections
- NPSA-9e: Railroad Tracks
- NPSA-9f: Arsenic Detection

The locations of each of the sites listed above in the NPSA were depicted in the North Plants SAR (EBASCO, 1989a/RIC 89166R05). The site-by-site exposure assessments for each of the 16 areas investigated are presented in Sections 2.1 through 2.16. A study area exposure summary for the NPSA is presented in Section 3.0.

The Soil Contaminant Concentration Tables in Sections 2.1 through 2.16, list the maximum concentrations that were calculated for each site over two depth intervals, designated as Horizon 1 and Horizon 2. Horizon 1 included depths from 0 to 10 feet (ft), and Horizon 2 accounted for all depths, including 0 to 10 ft. If the maximum concentration for all depths is in Horizon 1, then the listed concentration in Horizon 2 will equal

Horizon 1. For a further discussion, see Volume VI-A, Section 2.2.4. The Inductively Coupled Plasma (ICP) metals (i.e., cadmium, chromium, copper, lead, and zinc), arsenic, and mercury identified as site contaminants in the tables include only those which were detected above indicator levels. The following are the indicator levels used:

Contaminant	Indicator Level
Arsenic	CRL[1/]-10 ug/g[2/]
Cadmium	1-2 ug/g
Chromium	25-40 ug/g
Copper	20-35 ug/g
Lead	25-40 ug/g
Mercury	CRL-0.10 ug/g
Zinc	60-80 ug/g

As described in Volume VI-A of this report, nontarget contaminants were subjected to two screening processes to determine whether or not they should be evaluated in detail in the site-by-site exposure assessments. The first screening was conducted as part of the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01), and was based on the toxicity, concentration, and frequency of occurrence of the nontarget compounds. Contaminants passing through this first screening were then subjected to a second screening that was conducted on a study area-by-study area basis within Appendix A of each Study Area Exposure Assessment (Volumes VI-B through VI-H). This second screening process considered frequency of occurrence, similarity of the nontarget concentration to that of target contaminants, and co-occurrence of nontarget compounds with target compounds in the soil and sediment samples. The reader is encouraged to consult the RMA Chemical Index and the Study Area Exposure Assessment Appendices for details of the screening processes, as it was judged too repetitive to include this information in each site where nontargets were detected.

Draft PPLVs for each of the site contaminants were computed for the five exposed populations of concern which are regulated visitors, casual visitors, recreational visitors,

1/ certified reporting limit
2/ micrograms per gram

commercial workers, and industrial workers for the direct (i.e., soil ingestion, dermal contact and suspended particulate inhalation) and indirect (i.e., open and enclosed space vapor inhalation) exposure pathways, according to the methodology detailed in Volume IV of the Exposure Assessment. Draft PPLVs for each site are presented in the Exposure Evaluation Tables. Figure NPSA-1-0 explains various aspects of the data presented in the Exposure Evaluation Tables. For a further discussion of these tables, see Section 3.0 in Volume VI-A.

The cumulative Draft PPLVs in these tables for ICP metals, arsenic, and mercury do not include the single pathway preliminary pollutant limit values (SPPPLVs) computed for vapor inhalation exposure pathways since the potential for inhalation of vaporized ICP metals, arsenic, and mercury is assumed to be negligble (see Volume VI-A). SPPPLVs for the inhalation pathways are not included in the cumulative Draft PPLVs for chloroacetic acid, 1,2-dichloroethylene, dimethylmethyl phosphonate, Dithiane, fluoroacetic acid, isopropylmethyl phosphate, isopropylmethyl phosphonic acid, n-nitrosodimethylamine, 1,4-Oxathiane, Sarin, and thiodiglycol. These chemicals are highly soluble (log Kow less than one) and, therefore, are assumed to have low potential for vaporization. Draft PPLVs were not computed for nontarget chemicals measured at this site since these contaminants were rejected in the nontarget screening (Appendix A).

The chemical-specific and site-specific parameters used to calculate the open and enclosed space vapor inhalation PPLVs are included in the RMA Source Data File, provided as part of the PPLV Computer Model for RMA (Volume V). Contaminant-specific parameters for the open space pathways are the depth to the top of the contamination zone (d), and the depth to the bottom of the contamination zone (h), diffusivity and soil concentration. These variables are calculated as described in Volume IV. The site-specific parameter, X/F_o, represents the wind dispersion factor at the receptor location receiving the maximum concentration. This parameter was generated by the Industrial Source Complex Long Term (ISCLT) model as described in Volume IV. The distance from the center of the site to the critical receptor location, D_{max}, used with the computation of X/F_o, was calculated as described in Volume IV.

...ure A... -9
Sample Exposure Summary Table

1	2	3	4	5	6	7	8	9	10
Contaminant	Direct PPLV	Indirect PPLV [1/] OSVI [3/]	Indirect PPLV [1/] ESVI [4/]	Cumulative PPLV	Direct EI [5/]	Indirect EI	Cumulative EI	VEI [2/] OPN [6/]	VEI [2/] ENC [7/]
ORGANICS (Only contaminants found in either the soil or the groundwater are listed.)									
Aldrin	1.16E-01	1.17E+04	4.20E+01	1.16E-01	6.87E+02*	1.91E+00*	6.89E+02*	2.23E-06	1.68E-03
Carbon Tetrachloride	1.52E+01	0.00E+00	0.00E+00	1.52E+01	0.00E+00	0.00E+00	0.00E+00	6.07E-04	4.58E-01
Chlordane	1.52E+00	1.26E+06	5.17E+00	1.17E+00	5.27E+02*	1.55E+02*	6.81E+02*	0.00E+00	0.00E+00
Chloroform	3.11E+02	0.00E+00	0.00E+00	3.11E+02	0.00E+00	0.00E+00	0.00E+00	1.36E-05	1.02E-02
PPDDE	5.72E+00	7.07E+05	1.95E+01	4.42E+00	1.43E-02	4.21E-03	1.85E-02	1.34E-07	1.02E-04
PPDDT	5.72E+00	1.49E+06	1.95E+01	4.42E+00	1.75E+00*	5.14E-01*	2.26E+00*	0.00E+00	0.00E+00
Dieldrin	1.22E-01	5.35E+03	1.92E+01	1.22E-01	2.45E+04*	1.57E+02*	2.47E+04*	0.00E+00	0.00E+00
Diisopropylmethyl Phosphonate	6.77E+04	0.00E+00	0.00E+00	6.77E+04	0.00E+00	0.00E+00	0.00E+00	3.13E-10	2.37E-07
Endrin	2.54E+02	4.33E+06	1.00E+06	2.50E+02	7.88E-02	1.29E-03 a	8.01E-02	0.00E+00	0.00E+00
Hexachlorocyclopentadiene	3.84E+02	5.96E+01	8.34E-01	8.20E-01	7.81E+00*	3.65E+03*	3.66E+03*	0.00E+00	0.00E+00
Isodrin	5.92E+01	8.47E+05	3.04E+03	5.81E+01	8.45E+00*	1.65E-01*	8.61E+00*	0.00E+00	0.00E+00
Supona	1.27E+02	0.00E+00	0.00E+00	1.27E+02	00.E+00	0.00E+00	0.00E+00	1.39E-12	1.05E-09
METALS									
Arsenic	1.61E+00	0.00E+00	0.00E+00	1.61E+00	1.30E+01*	0.00E+00	1.30E+01*	0.00E+00	0.00E+00
Copper	5.71E+02	0.00E+00	0.00E+00	5.71E+04	6.83E-04	0.00E+00	6.83E-04	0.00E+00	0.00E+00
Mercury	4.61E+02	0.00E+00	0.00E+00	4.61E+02	2.38E-03	0.00E+00	2.38E-03	0.00E+00	0.00E+00
Zinc	1.39E+05	0.00E+00	0.00E+00	1.39E+05	7.17E-04	0.00E+00	7.17E-04	0.00E+00	0.00E+00

a This contaminant saturates the soil gas and produces a vapor flux that is below one-tenth of the critical flux. The SPPPLV [8/] for this contaminant is considered to be equal to pure compound. The SPPPLV has therefore been set to 1.00E+06 mg/kg (See volume VI-A).

A direct PPLV will be computed even if contaminant does not occur in the soil but only in the groundwater.

Indirect PPLVs are not computed for the nonvolatile contaminants (metals).

Contaminants with a Direct EI > 0.1 are denoted with an asterisk.

Contaminants with an Indirect EI > 0.1 are denoted with an asterisk. A contaminant which saturates the soil gas will not show a VEI.

A contaminant which saturates the soil gas but does not have an Indirect EI exceedance will be denoted with the footnote marker "a." The indirect PPLVs (OSVI, ESVI) are set to 1.00E+06 (pure compound).

Contaminants which occur in the groundwater, but also occur in the soil may not have a computed VEI if the contamination saturates the soil gas.

VEIs are not computed for metals or organics if the contaminant does not occur in the groundwater.

An enclosed space VEI may not be computed if the reported depth to groundwater is less than 10 ft. In such cases, the enclosed space VEI will have "NA" for not applicable. No enclosed space VEI will be computed for lake sites. For lake sites, the enclosed space VEI will have "LS" for lake site.

1/ PPLV - preliminary pollutant limit value
2/ VEI - vapor exposure index
3/ OSVI - open space vapor inhalation PPLLV
4/ ESVI - enclosed space vapor inhalation PPLV
5/ EI - exposure index
6/ OPN - open
7/ ENC - enclosed
8/ SPPPLV - single pathway preliminary pollutant limit value

Site-by-site comparisons of the maximum site contaminant concentrations to their corresponding cumulative Draft PPLVs were done in order to determine sites which may be considered for remedial action during the Feasibility Study. These are ranked into two categories: Priority 1 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations exceed the draft human health based criteria, and Priority 2 which consists of sites where available soil contaminant concentration data indicate that the maximum detected concentrations do not exceed the draft human health based criteria. Site designations will be reconsidered throughout the Endangerment Assessment process as health based criteria are refined and additional data become available.

2.0 SITE-BY-SITE EXPOSURE ASSESSMENT

2.1 SITE NPSA-1: CHEMICAL SEWER SYSTEM (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.1.1 Site-Specific Considerations

Figure NPSA-1-1 and Table NPSA-1-1 depict the target contaminants for Site NPSA-1. Borings 32, 34/34B, 38B, 39, 43, 49, 62, 63/63B, 64, 80, 81/81B, and 82/82B were included in this exposure assessment, consistent with the North Plants SAR. The chemical sewer system carried aqueous wastes from the North Plants Complex to Basin A and later to Basin F; therefore, many of the chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-1 (EBASCO, 1988a/RIC 88256R05).

2.1.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-1 are depicted in Figure NPSA-1-1. Table NPSA-1-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and certified reporting limits (CRLs) for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No groundwater data table was included for Site NPSA-1 since this site is a sewer line (see Volume VI-A).

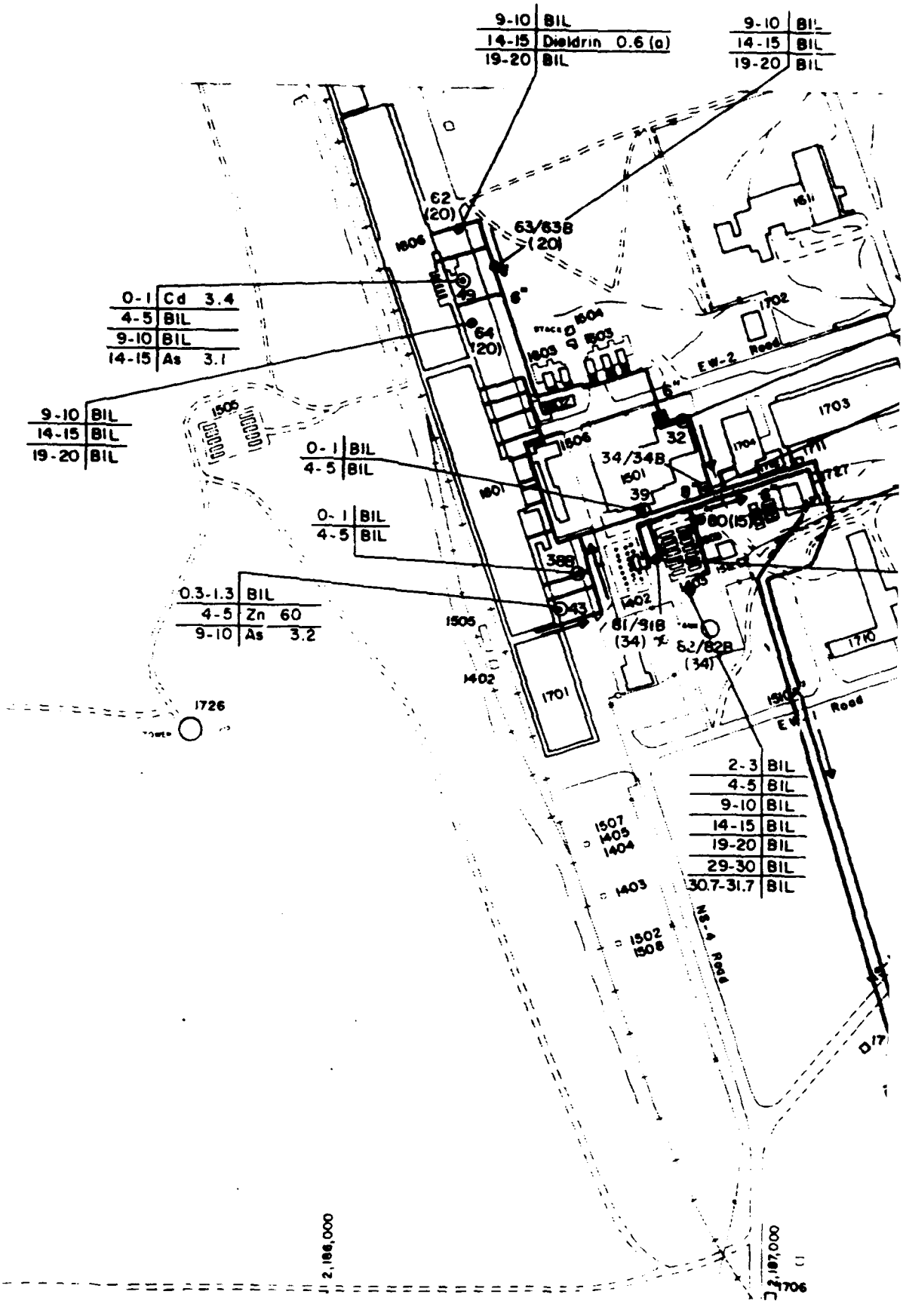
2.1.3 Site Exposure Summary

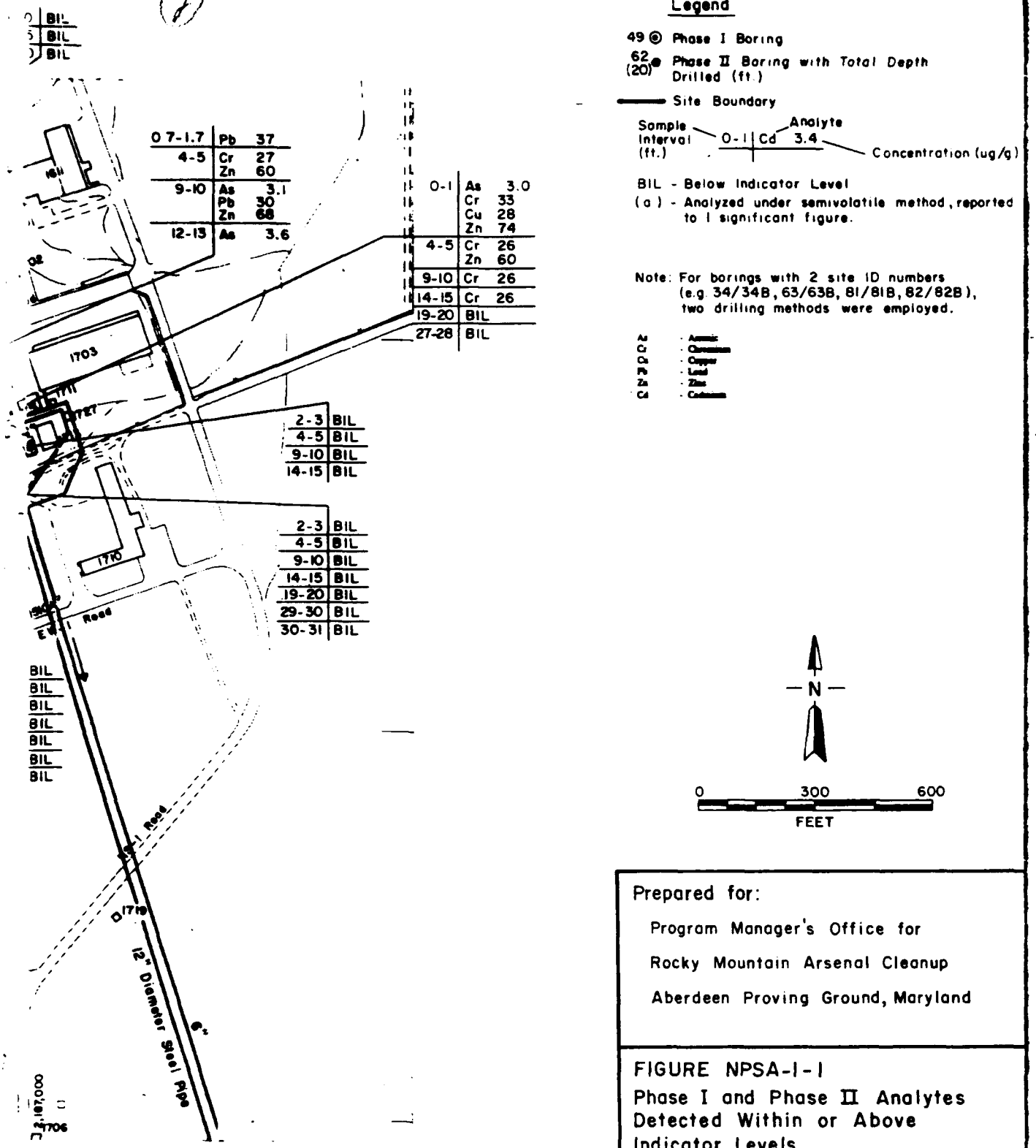
Tables NPSA-1-2 through NPSA-1-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Cadmium	--	--	--	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-1 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).


9-10 BIL
14-15 Dieldrin 0.6 (a)
19-20 BIL
9-10 BIL
14-15 BIL
19-20 BIL
62 (20)
63/63B (20)
64 (20)
0-1 Cd 3.4
4-5 BIL
9-10 BIL
14-15 As 3.1
9-10 BIL
14-15 BIL
19-20 BIL
0-1 BIL
4-5 BIL
0-1 BIL
4-5 BIL
0.3-1.3 BIL
4-5 Zn 60
9-10 As 3.2
1726
1506
1505
1504
1503
1502
1501
1402
1701
1702
1703
1710
1711
1727
34/34B
39
80(15)
81/81B (34)
82/82B (34)
EW-2 Road
EW-1 Road
NS-4 Road
2-3 BIL
4-5 BIL
9-10 BIL
14-15 BIL
19-20 BIL
29-30 BIL
30.7-31.7 BIL
1507
1405
1404
1403
1502
1508
2,186,000
2,187,000
1706



Prepared for:

Program Manager's Office for

Rocky Mountain Arsenal Cleanup

Aberdeen Proving Ground, Maryland

FIGURE NPSA-1-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

NPSA-2-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

	DIRECT	INDIRECT	CUMULATIVE	DIRECT	INDIRECT	CUMULATIVE	VEI

TABLE NPSA-1-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-1

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Dieldrin	--	--	--	0.6	14-15	62
Cadmium	3.4	0-1	49	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

NPSA-1-2

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
DIELDRIN	1.6E+00	7.9E+07	1.6E+00	0.0E+00	7.6E-09	7.6E-09	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	7.5E-03	0.0E+00	7.5E-03	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-1-3

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
DIELDRIN	1.6E+00	7.9E+07	1.6E+00	0.0E+00	7.6E-09	7.6E-09	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	7.5E-03	0.0E+00	7.5E-03	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-1-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
DIELDRIN	2.2E-01	5.2E+06	2.2E-01	0.0E+00	1.2E-07	1.2E-07	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	5.9E-02	0.0E+00	5.9E-02	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-1-5

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
DIELDRIN	2.0E+00	6.3E+03	2.0E+00	0.0E+00	9.5E-05	9.5E-05	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	9.5E-03	0.0E+00	9.5E-03	0.0E+00

NPSA-1-6

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
IELDRIN	1.2E-01	1.0E+07	2.1E+03	1.2E-01	0.0E+00	2.8E-04	2.8E-04	0.0E+00	0.0E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	4.5E-01*	0.0E+00	4.5E-01*	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

2.2 SITE NPSA-2: TANK FARM (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.2.1 Site-Specific Considerations

Figure NPSA-2-1 and Tables NPSA-2-1 and NPSA-2-2 depict the target contaminants for Site NPSA-2. Borings 36 and 36B were included in this exposure assessment consistent with the North Plants SAR. The historical search conducted under the contamination assessment revealed that carbon tetrachloride may have been stored on Site NPSA-2 (EBASCO, 1988a/RIC 88256R05); however, it was not detected in soils during the Phase I investigation. This site occupies the area surrounding Tank Farm 1403 and the associated under and above ground piping. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-2 (EBASCO, 1988a/RIC 88256R05).

2.2.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-2 are depicted in Figure NPSA-2-1. Table NPSA-2-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury for Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-2-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.2.3 Site Exposure Summary

Tables NPSA-2-3 through NPSA-2-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-2 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

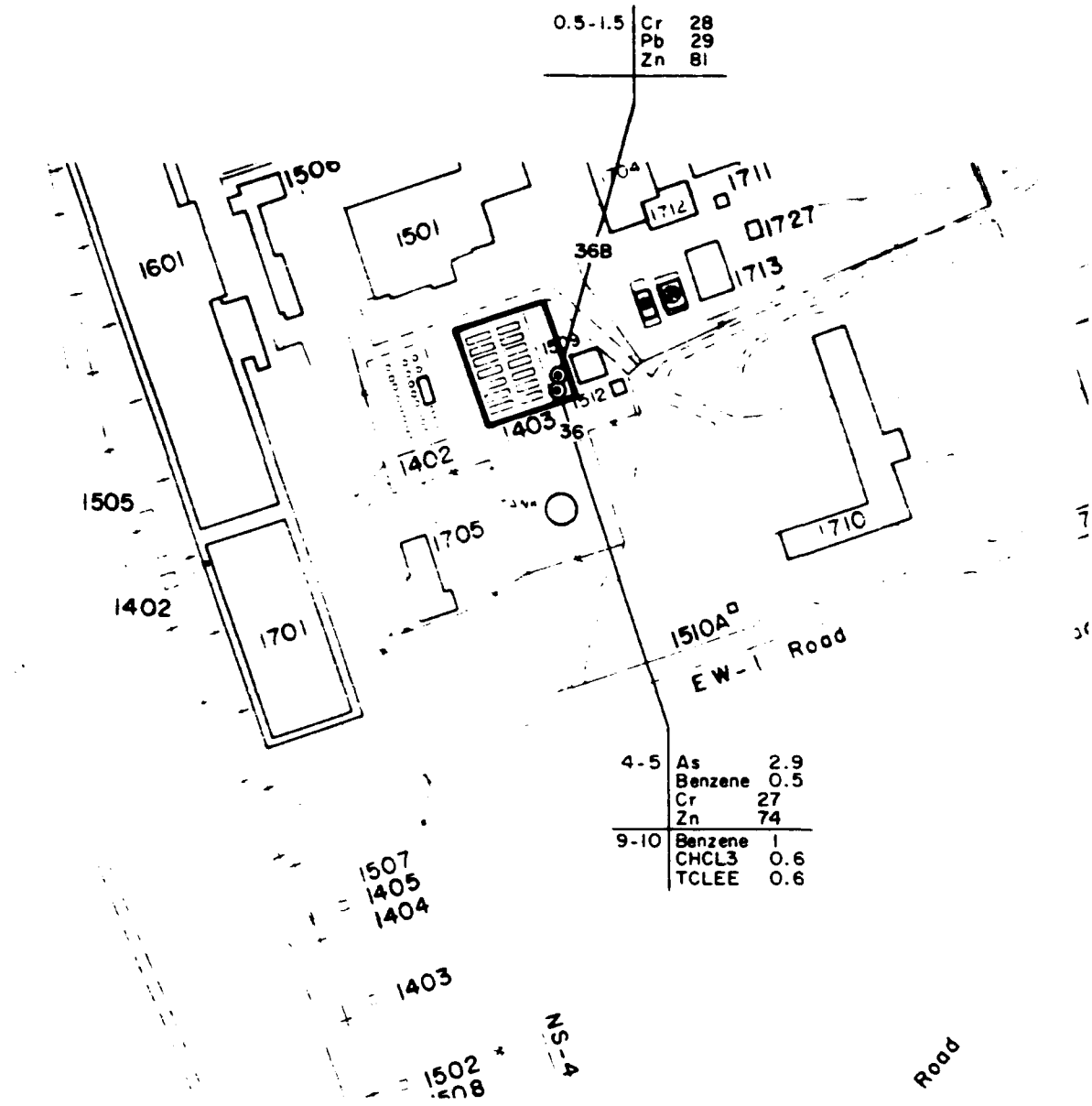
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Benzene	--	--	--	Indirect	Indirect
Chloroform	--	--	--	Indirect	Indirect
Tetrachloroethylene	--	--	--	Indirect	Indirect

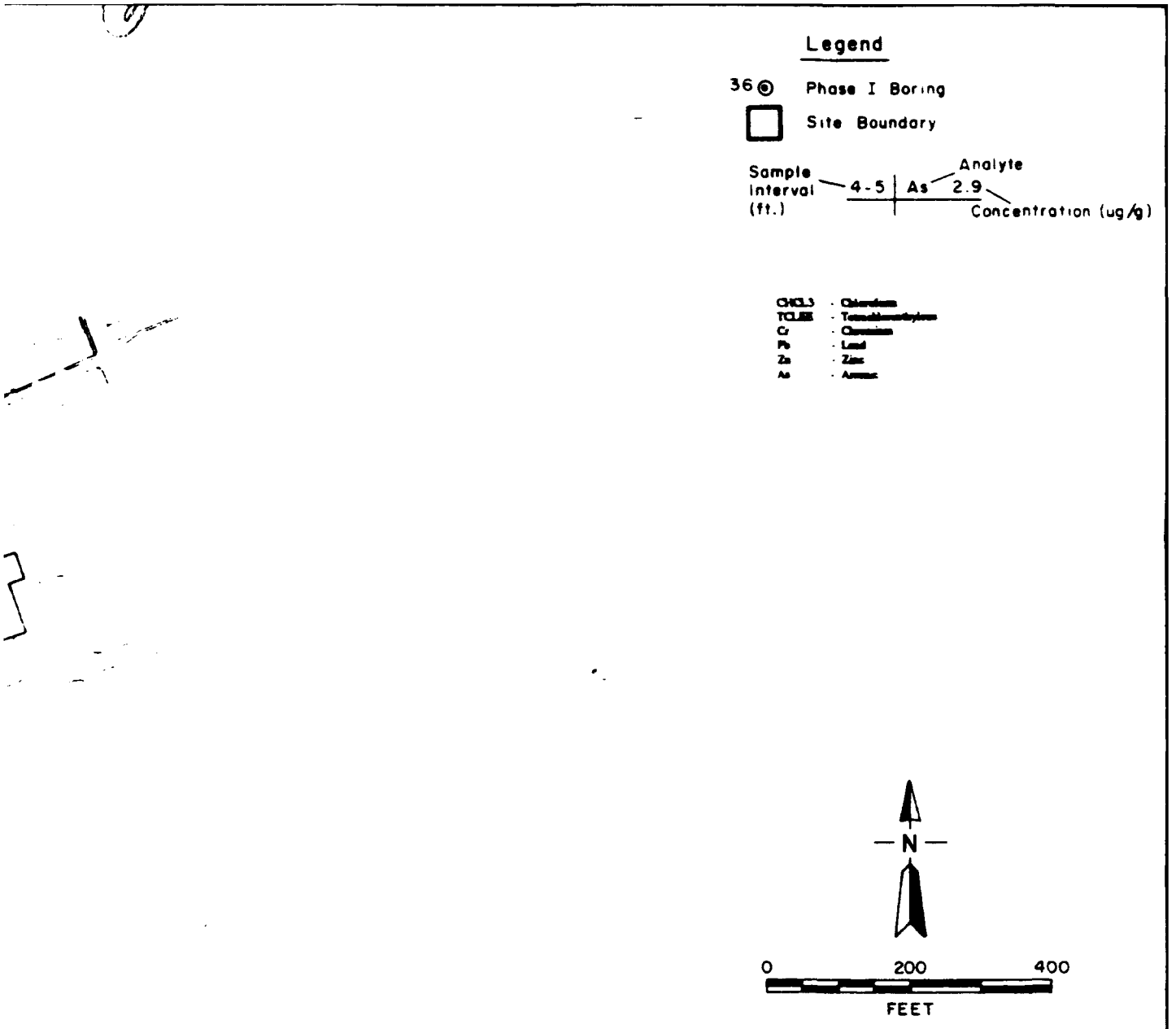
Note: Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the indirect pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-2 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- 1,1-Dichloroethylene (enclosed)


0.5-1.5
Cr 28
Pb 29
Zn 81
1500
1501
1601
1711
1712
1727
1713
36B
1509
1512
1403
36
1402
1505
1705
1710
1402
1701
1510A
EW-1 Road
4-5
As 2.9
Benzene 0.5
Cr 27
Zn 74
9-10
Benzene 1
CHCL3 0.6
TCLEE 0.6
1507
1405
1404
1403
1502
1508
NS-4
Road



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-2-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-2-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-2

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Benzene	1	9-10	36	1	9-10	36
Chloroform	0.6	9-10	36	0.6	9-10	36
Tetrachloroethylene	0.6	9-10	36	0.6	9-10	36
Zinc	81	0.5-1.5	36B	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE NPSA-2-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-2

AVERAGE SITE DEPTH TO GROUNDWATER: 34 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2.5	25042	05/25/88
1,1-DICHLOROETHYLENE	8.9	25042	05/25/88
1,1-DICHLOROETHANE	1.7	25042	05/25/88
CARBON TETRACHLORIDE	65	25042	05/25/88
CHLOROFORM	470	25042	05/25/88
DIISOPROPYLMETHYL PHOSPHONATE	40	25042	05/25/88
TRICHLOROETHYLENE	100	25042	05/25/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-2-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.9E+04	8.3E+02	1.2E-03	5.1E-05	1.2E-03	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	8.5E-05
CHLOROFORM	4.0E+03	1.1E+05	3.9E+03	1.5E-04	5.5E-06	1.5E-04	5.3E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.6E-11
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-04
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-11
TETRACHLOROETHYLENE	5.1E+02	2.7E+05	5.1E+02	1.2E-03	2.2E-06	1.2E-03	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-10
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	6.6E-06
ZINC	2.0E+06	0.0E+00	2.0E+06	4.1E-05	0.0E+00	4.1E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-2-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.9E+04	8.3E+02	1.2E-03	5.1E-05	1.2E-03	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	8.5E-05
CHLOROFORM	4.0E+03	1.1E+05	3.9E+03	1.5E-04	5.5E-06	1.5E-04	5.3E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	3.6E-11
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-04
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-11
TETRACHLOROETHYLENE	5.1E+02	2.7E+05	5.1E+02	1.2E-03	2.2E-06	1.2E-03	0.0E+00
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	1.1E-10
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	6.6E-06
ZINC	2.0E+06	0.0E+00	2.0E+06	4.1E-05	0.0E+00	4.1E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-2-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	1.2E+02	3.0E+03	1.2E+02	8.4E-03	3.3E-04	8.7E-03	0.0E+00
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	1.3E-03
CHLOROFORM	5.6E+02	1.7E+04	5.4E+02	1.1E-03	3.5E-05	1.1E-03	8.0E-05
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	5.4E-10
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-03
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-10
TETRACHLOROETHYLENE	7.1E+01	4.2E+04	7.1E+01	8.4E-03	1.4E-05	8.5E-03	0.0E+00
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	7.3E-10
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	9.9E-05
ZINC	1.1E+06	0.0E+00	1.1E+06	7.7E-05	0.0E+00	7.7E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-2-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
BENZENE	1.1E+03	6.4E-01	6.4E-01	9.2E-04	1.6E+00*	1.6E+00*	0.0E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.8E+00
CHLOROFORM	5.1E+03	2.3E+00	2.3E+00	1.2E-04	2.6E-01*	2.6E-01*	1.1E-01
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	7.7E-07
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	3.2E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-06
TETRACHLOROETHYLENE	6.5E+02	5.8E+00	5.7E+00	9.2E-04	1.0E-01*	1.1E-01*	0.0E+00
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	7.3E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-01
ZINC	7.8E+05	0.0E+00	7.8E+05	1.0E-04	0.0E+00	1.0E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-2-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
ENZENE	6.7E+01	2.6E+03	6.4E-01	6.3E-01	1.5E-02	1.6E+00*	1.6E+00*	0.0E+00	0.0E+00
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	6.4E-04	5.5E+00
CHLOROFORM	3.1E+02	1.5E+04	2.3E+00	2.3E+00	1.9E-03	2.6E-01*	2.6E-01*	4.0E-05	3.4E-01
,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	2.7E-10	2.3E-06
,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-03	9.7E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-10	4.4E-06
ETRACHLOROETHYLENE	4.1E+01	3.7E+04	5.8E+00	5.0E+00	1.5E-02	1.0E-01*	1.2E-01*	0.0E+00	0.0E+00
,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	8.5E-10	7.3E-06
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-05	4.2E-01
INC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	5.8E-04	0.0E+00	5.8E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.3 SITE NPSA-3: GB MANUFACTURING AREA (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.3.1 Site-Specific Considerations

Figure NPSA-3-1 and Tables NPSA-3-1 and NPSA-3-2 depict the target contaminants for Site NPSA-3 Borings 22, 31/31B, 33, 44, 65, 66, 76 through 79 were included in this exposure assessment, consistent with the North Plants SAR. The historical search conducted under the contamination assessment revealed that Sarin (GB), GB by-products, carbon tetrachloride, methylene chloride, and xylene were suspected contaminants in Site NPSA-3 (EBASCO, 1988a/RIC 88256R05); however, most of these chemicals were not detected in soils during the Phase I and Phase II investigations. This site occupies the areas around the GB manufacturing Buildings 1501, 1503, 1504, 1506, 1602, and 1603. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-3 (EBASCO, 1988a/RIC 88256R05).

2.3.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-3 are depicted in Figure NPSA-3-1. Table NPSA-3-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-3-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.3.3 Site Exposure Summary

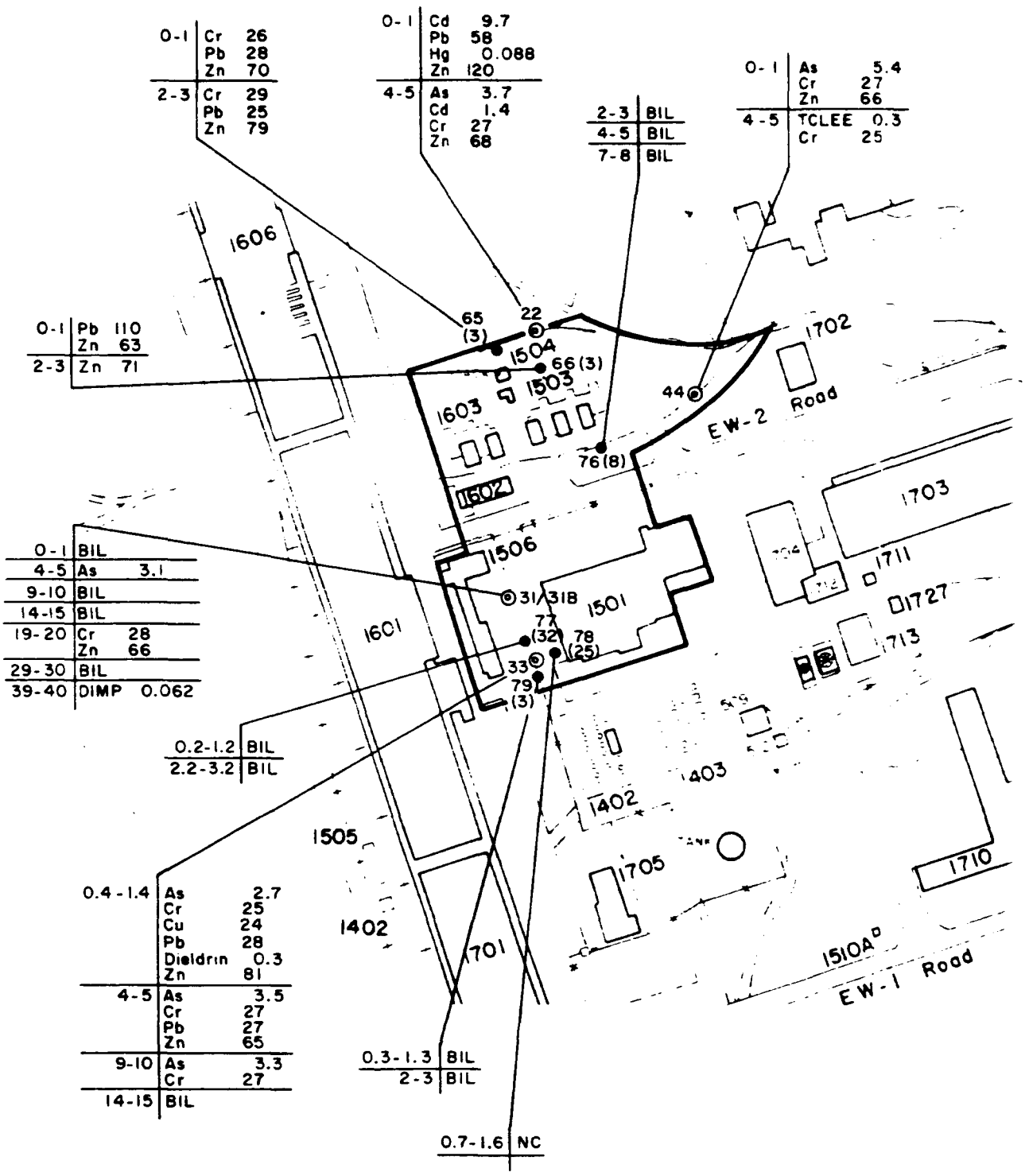
Tables NPSA-3-3 through NPSA-3-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-3 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Direct
Cadmium	--	--	Direct	--	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-3 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.


0-1 Cr 26
Pb 28
Zn 70
2-3 Cr 29
Pb 25
Zn 79
0-1 Cd 9.7
Pb 58
Hg 0.088
Zn 120
4-5 As 3.7
Cd 1.4
Cr 27
Zn 68
2-3 BIL
4-5 BIL
7-8 BIL
0-1 As 5.4
Cr 27
Zn 66
4-5 TCLEE 0.3
Cr 25
0-1 Pb 110
Zn 63
2-3 Zn 71
0-1 BIL
4-5 As 3.1
9-10 BIL
14-15 BIL
19-20 Cr 28
Zn 66
29-30 BIL
39-40 DIMP 0.062
0.2-1.2 BIL
2.2-3.2 BIL
0.4-1.4 As 2.7
Cr 25
Cu 24
Pb 28
Dieldrin 0.3
Zn 81
4-5 As 3.5
Cr 27
Pb 27
Zn 65
9-10 As 3.3
Cr 27
14-15 BIL
0.3-1.3 BIL
2-3 BIL
0.7-1.6 NC
1606
1603
1602
1601
1506
1504
1503
1501
1505
1402
1701
1702
1703
1711
1727
1713
1403
1705
1710
1510A
EW-2 Road
EW-1 Road
65 (3)
22
66 (3)
44
76 (8)
31
318
77 (32)
78 (25)
33
79 (3)

Legend

22 ⊙ Phase I Boring

65 (3) ● Phase II Boring with Total Depth Drilled (ft.)

—— Site Boundary

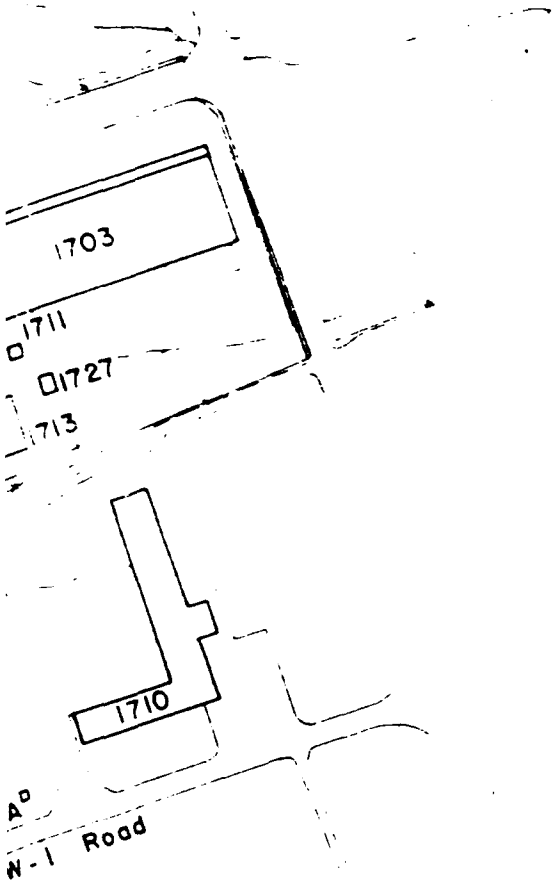
Sample Interval (ft.) — O-1 | Cr 26 — Analyte — Concentration (ug/g)

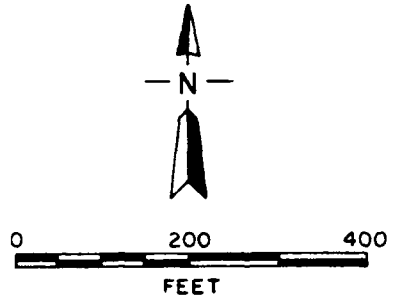
BIL - Below Indicator Level
NC - Sample Not Collected

Note: For borings with 2 site ID numbers (e.g. 31/31B), two drilling methods were employed.

DDMP - Dimethylphenyl phosphonate
TCLEE - Tetrachloroethylene
As - Arsenic
Cd - Cadmium
Cr - Chromium
Cu - Copper
Hg - Mercury
Pb - Lead
Zn - Zinc

5.4
27
56
0.3
25





Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-3-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE NPSA-3-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-3

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Dieldrin	0.3	0.4-1.4	33	0.3	0.4-1.4	33
Diisopropylmethyl phosphonate	--	--	--	0.062	39-40	31/31B
Tetrachloroethylene	0.3	4-5	44	0.3	4-5	44
Cadmium	9.7	0-1	22	--	--	--
Lead	110	0-1	66	--	--	--
Zinc	120	0-1	22	--	--	--

NPSA	North Plants Study Area
Max.	Maximum
ug/g	microgram per gram
ft	foot/feet

TABLE NPSA-3-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-3

AVERAGE SITE DEPTH TO GROUNDWATER: 33 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
BENZENE	6.7	25047	01/4/89
CARBON TETRACHLORIDE	9.9	25047	01/7/88
CHLOROFORM	38	25047	01/4/89
CHLOROBENZENE	1.5	25047	01/4/89
DIBROMOCHLOROPROPANE	9.1	25047	01/4/89
DIISOPROPYLMETHYL PHOSPHONATE	330	25047	01/7/88
TRICHLOROETHYLENE	1.6	25047	01/4/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-3-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-05
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.1E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.8E-08
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-05
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-05
DIELDRIN	1.6E+00	2.4E+04	1.6E+00	1.9E-01*	1.3E-05	1.9E-01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	6.5E+05	3.3E+05	0.0E+00	9.6E-08	9.6E-08	2.2E-08
TETRACHLOROETHYLENE	5.1E+02	1.2E+04	4.9E+02	5.9E-04	2.5E-05	6.1E-04	0.0E+00
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	4.1E-06
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.2E-02	0.0E+00	2.2E-02	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-03	0.0E+00	7.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-3-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	0.0E+00	8.6E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-05
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	5.1E-04
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	3.8E-08
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-05
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	5.6E-05
DIELDRIN	1.6E+00	2.4E+04	1.6E+00	1.9E-01*	1.3E-05	1.9E-01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	6.5E+05	3.3E+05	0.0E+00	9.6E-08	9.6E-08	2.2E-08
TETRACHLOROETHYLENE	5.1E+02	1.2E+04	4.9E+02	5.9E-04	2.5E-05	6.1E-04	0.0E+00
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	4.1E-06
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.2E-02	0.0E+00	2.2E-02	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-03	0.0E+00	7.1E-03	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-3-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	1.2E+02	0.0E+00	1.2E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-04
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	7.6E-03
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-07
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-04
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	8.4E-04
DIELDRIN	2.2E-01	1.6E+03	2.2E-01	1.4E+00*	1.9E-04	1.4E+00*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	1.0E+05	7.4E+04	0.0E+00	6.2E-07	6.2E-07	1.4E-07
TETRACHLOROETHYLENE	7.1E+01	1.9E+03	6.8E+01	4.2E-03	1.6E-04	4.4E-03	0.0E+00
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	6.2E-05
CADMIUM	5.8E+01	0.0E+00	5.8E+01	1.7E-01*	0.0E+00	1.7E-01*	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.2E-02	0.0E+00	1.2E-02	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value calculated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-3-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
BENZENE	1.1E+03	0.0E+00	1.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-02
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.9E-01
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	6.4E-05
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	9.4E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-02
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.5E-01*	5.2E-03	1.6E-01*	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	4.4E+02	4.4E+02	0.0E+00	1.4E-04	1.4E-04	3.8E-05
TETRACHLOROETHYLENE	6.5E+02	2.2E+02	1.7E+02	4.6E-04	1.3E-03	1.8E-03	0.0E+00
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-03
CADMIUM	3.6E+02	0.0E+00	3.6E+02	2.7E-02	0.0E+00	2.7E-02	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.7E-02	0.0E+00	1.7E-02	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.5E-04	0.0E+00	1.5E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-3-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
BENZENE	6.7E+01	0.0E+00	0.0E+00	6.7E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-04	3.4E-02
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.8E-03	8.6E-01
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	2.8E-07	6.4E-05
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-04	2.8E-02
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	4.2E-04	9.5E-02
DIELDRIN	1.2E-01	3.2E+03	1.9E+01	1.2E-01	2.5E+00*	1.6E-02	2.5E+00*	0.0E+00	0.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	8.6E+04	4.4E+02	4.4E+02	0.0E+00	1.4E-04	1.4E-04	1.7E-07	3.8E-05
TETRACHLOROETHYLENE	4.1E+01	1.6E+03	2.2E+02	3.4E+01	7.3E-03	1.5E-03	8.8E-03	0.0E+00	0.0E+00
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	3.1E-05	7.0E-03
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	1.3E+00*	0.0E+00	1.3E+00*	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.0E-02	0.0E+00	5.0E-02	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	8.6E-04	0.0E+00	8.6E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.4 SITE NPSA-4: FUZE AND DETONATOR MAGAZINE (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.4.1 Site-Specific Considerations

Figure NPSA-4-1 and Tables NPSA-4-1 and NPSA-4-2 depict the target contaminants for Site NPSA-4. Borings 4 and 51 were included in this exposure assessment, consistent with the North Plants SAR. This site occupies the area surrounding Building 1608 fuze and detonator magazine and downgradient surface drainage. According to site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-4 (EBASCO, 1988a/RIC 88256R05).

2.4.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-4 are depicted in Figure NPSA-4-1. Table NPSA-4-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-4-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.4.3 Site Exposure Summary

Tables NPSA-4-3 through NPSA-4-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-4 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

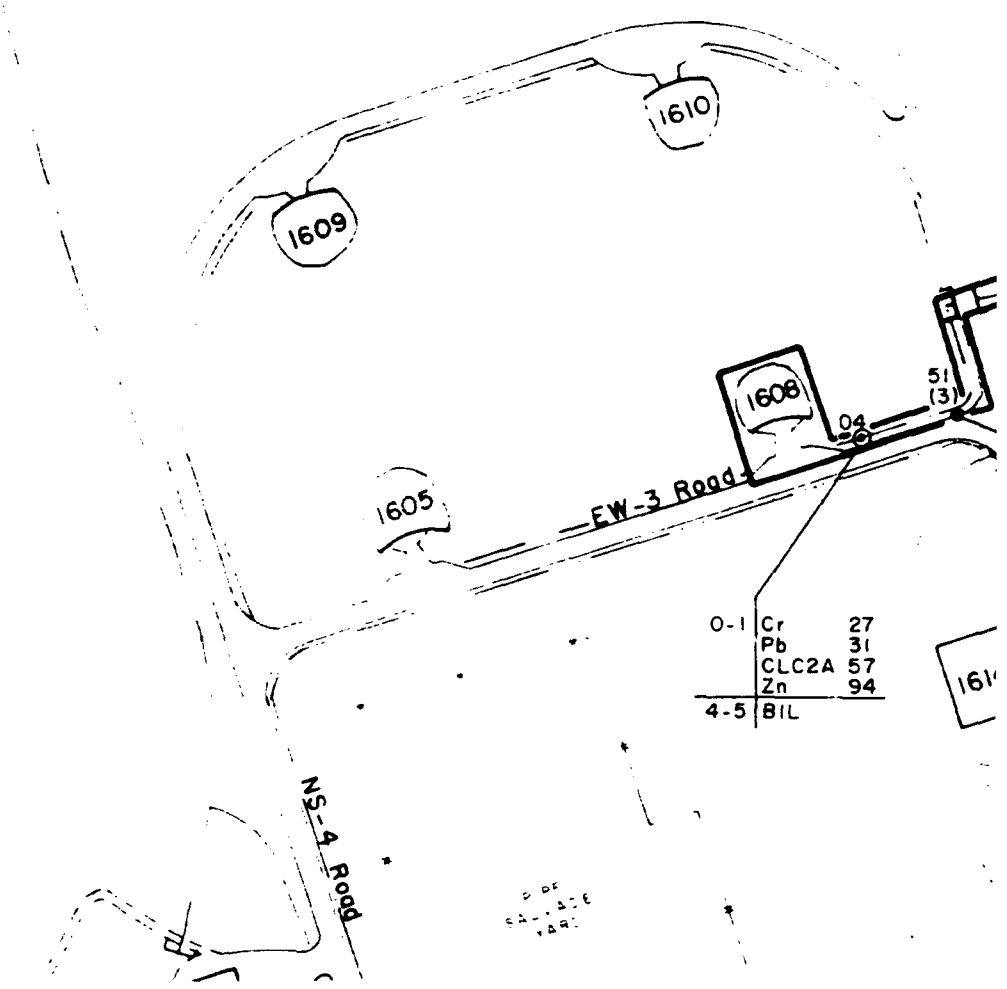
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Chloroacetic Acid	--	--	--	--	Direct

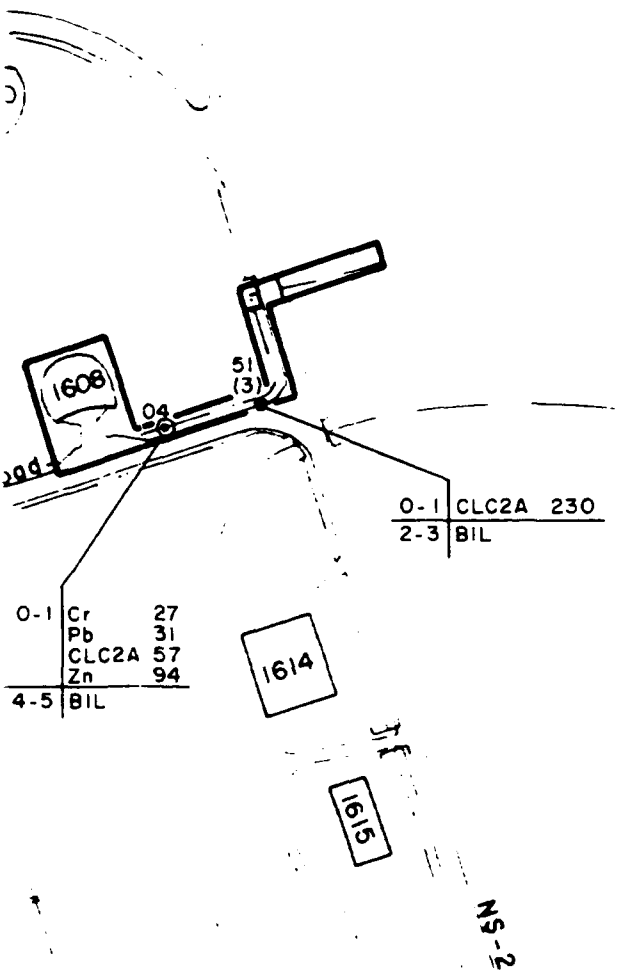
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-4 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- 1,1-Dichloroethylene (enclosed)


1610
1609
1608
1605
EW-3 Road
NS-4 Road
0-1
Cr 27
Pb 31
CLC2A 57
Zn 94
4-5
BIL



Legend

04 ◎ Phase I Boring

51 (3) ● Phase II Boring with Total Depth Drilled (ft.)

□ Site Boundary

Sample Interval (ft.) — 0-1 | Cr 27 — Analyte; Concentration (ug/g)

BIL - Below Indicator Level

CLC2A - Chloramnic acid
Cr - Chromium
Pb - Lead
Zn - Zinc

N

0 200 400
FEET

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-4-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE NPSA-4-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-4

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Chloroacetic acid	230	0-1	51	230	0-1	51
Zinc	94	0-1	4	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE NPSA-4-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-4

AVERAGE SITE DEPTH TO GROUNDWATER: 36 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	0.97	25054	02/8/89
1,1-DICHLOROETHYLENE	1.2	25054	02/8/89
CARBON TETRACHLORIDE	3.6	25054	02/8/89
CHLOROFORM	7.1	25048	01/4/89
CHLOROBENZENE	1.1	25048	01/4/89
DIBROMOCHLOROPROPANE	5.2	25048	01/4/89
DIISOPROPYLMETHYL PHOSPHONATE	GT 200	25054	02/8/89
DITHIANE	1.6	25048	06/2/88
TETRACHLOROETHYLENE	1.9	25054	02/8/89
TRICHLOROETHYLENE	1.8	25054	02/8/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-4-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.4E-06
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	1.4E-02	0.0E+00	1.4E-02	0.0E+00
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-10
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	7.7E-07
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.3E-10
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	6.0E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	4.2E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-07
ZINC	2.0E+06	0.0E+00	2.0E+06	4.7E-05	0.0E+00	4.7E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-4-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.4E-06
CHLOROACETIC ACID	1.7E+04	0.0E+00	1.7E+04	1.4E-02	0.0E+00	1.4E-02	0.0E+00
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-10
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.6E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	7.7E-07
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	2.0E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.3E-10
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	6.0E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	4.2E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-07
ZINC	2.0E+06	0.0E+00	2.0E+06	4.7E-05	0.0E+00	4.7E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-4-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	6.7E-05
CHLOROACETIC ACID	7.0E+03	0.0E+00	7.0E+03	3.3E-02	0.0E+00	3.3E-02	0.0E+00
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	4.4E-09
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-04
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-09
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	9.1E-07
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.7E-10
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.7E-06
ZINC	1.1E+06	0.0E+00	1.1E+06	8.9E-05	0.0E+00	8.9E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-4-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	9.3E-02
CHLOROACETIC ACID	9.2E+03	0.0E+00	9.2E+03	2.5E-02	0.0E+00	2.5E-02	0.0E+00
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	4.3E-05
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-02
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	4.2E-01
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-05
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	1.3E-03
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	2.6E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-03
ZINC	7.8E+05	0.0E+00	7.8E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00

NPSA-4-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
ARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.3E-05	2.8E-01
LOROACETIC ACID	1.7E+03	0.0E+00	0.0E+00	1.7E+03	1.4E-01*	0.0E+00	1.4E-01*	0.0E+00	0.0E+00
LOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-09	4.3E-05
LOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	5.7E-07	4.8E-03
BROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	5.8E-06	4.9E-02
,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-04	1.2E+00
ISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-09	2.1E-05
ITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-07	3.8E-03
,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	3.1E-10	2.6E-06
RICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	8.3E-07	6.9E-03
INC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.7E-04	0.0E+00	6.7E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.5 SITE NPSA-5: SPECIAL WEAPONS PLANT (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.5.1 Site-Specific Considerations

Figure NPSA-5-1 and Tables NPSA-5-1 and NPSA-5-2 depict the target contaminants for Site NPSA-5. Borings 20, 24, 26, 27, 50/50B, 67, 67B, 68, 68B, 69, 69B, 70, 70B, 71, 71B, and 72 through 75 were included in this exposure assessment, consistent with the North Plants SAR. The historical search conducted under the contamination assessment revealed that GB, GB by-products, mustard, Lewisite, 2,2-bis(Para-chlorophenyl)-1,1,1-trichloroethane (PPDDT), and thiodiglycol were suspected contaminants in Site NPSA-5 (EBASCO, 1988a/RIC 88256R05); however, most of these chemicals were not detected in soil during the Phase I and Phase II investigations. This site occupies the area surrounding the Special Weapons Plant Building 1611. According to site history, no other chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-5 (EBASCO, 1988a/RIC 88256R05).

2.5.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-5 are depicted in Figure NPSA-5-1. Table NPSA-5-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-5-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.5.3 Site Exposure Summary

Tables NPSA-5-3 through NPSA-5-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-5 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative

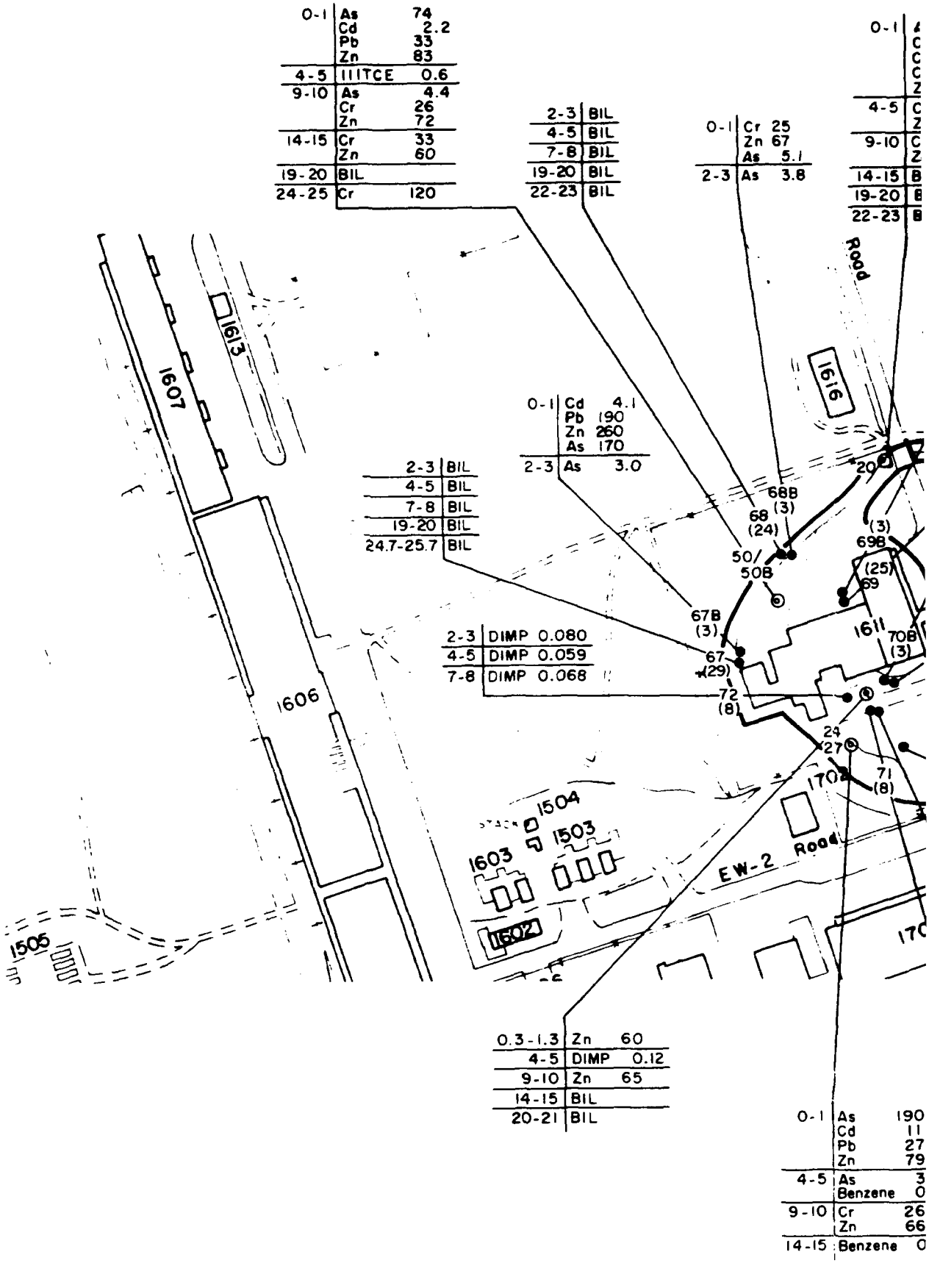
quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

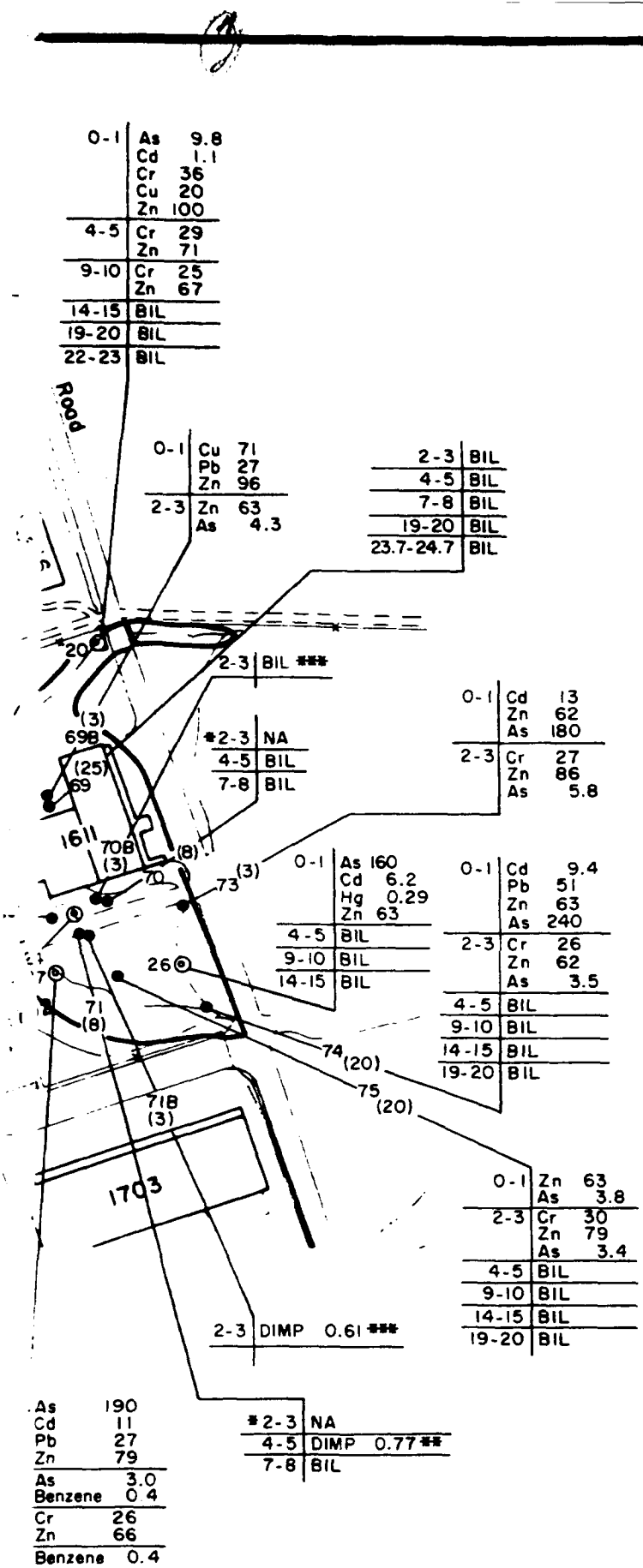
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Arsenic	Direct	Direct	Direct	Direct	Direct
Cadmium	--	--	Direct	--	Direct
Benzene	--	--	--	Indirect	Indirect

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways both contribute to the exceedance of the cumulative PPLVs. Site NPSA-5 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.


0-1 As 74
Cd 2.2
Pb 33
Zn 83
4-5 1,1,1-TCE 0.6
9-10 As 4.4
Cr 26
Zn 72
14-15 Cr 33
Zn 60
19-20 BIL
24-25 Cr 120
2-3 BIL
4-5 BIL
7-8 BIL
19-20 BIL
22-23 BIL
0-1 Cr 25
Zn 67
As 5.1
2-3 As 3.8
0-1 Cd 4.1
Pb 190
Zn 260
As 170
2-3 As 3.0
2-3 BIL
4-5 BIL
7-8 BIL
19-20 BIL
24.7-25.7 BIL
2-3 DIMP 0.080
4-5 DIMP 0.059
7-8 DIMP 0.068
0.3-1.3 Zn 60
4-5 DIMP 0.12
9-10 Zn 65
14-15 BIL
20-21 BIL
0-1 As 190
Cd 11
Pb 27
Zn 79
4-5 As 3
Benzene 0
9-10 Cr 26
Zn 66
14-15 Benzene 0
1607
1613
1606
1505
1504
1503
1603
1602
1616
1611
Road
EW-2 Road
68B (3)
68 (24)
50/ 50B
67B (3)
67 (29)
72 (8)
69B (3)
69 (25)
70B (3)
71 (8)
24 27
20
170



Legend

20 ◎ Phase I Boring

68 ● (24) Phase II Boring with Total Depth Drilled (ft.)

□ Site Boundary

Sample Interval (ft.) — 0-1 | As 74 — Analyte; Concentration (ug/g)

BIL - Below Indicator Level
NA - Sample Not Analyzed

* - Laboratory unable to perform phosphonate analysis, sample was redrilled.

** - Value reported exceeds laboratory's upper certified reporting limit.

*** - Laboratory holding times exceeded for organophosphorous compounds.

Note: For borings with 2 site ID numbers (e.g. 50/508), two drilling methods were employed.

DIMP - Diisopropylmethyl phosphonate
1,1,1-TCE - 1,1,1-Trichloroethane
As - Arsenic
Cd - Cadmium
Cr - Chromium
Cu - Copper
Pb - Lead
Hg - Mercury
Zn - Zinc

N

0 200 400
FEET

Prepared for.

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-5-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-5-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-5

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Benzene	0.4	4-5	27	0.4	4-5	27
	--	--	--		14-15	27
Diisopropylmethyl phosphonate	0.77 1/	4-5	71	0.77 1/	4-5	71
1,1,1-Trichloroethane	0.6	4-5	50/50B	0.6	4-5	50/50B
Arsenic	240	0-1	74	--	--	--
Cadmium	13	0-1	73	--	--	--
Copper	71	0-1	69B	--	--	--
Lead	190	0-1	67B	--	--	--
Mercury	0.29	0-1	26	--	--	--
Zinc	260	0-1	67B	--	--	--

1/ Value exceeds laboratory's upper certified reporting limit.

NPSA	North Plants Study Area
Max.	Maximum
ug/g	microgram per gram
ft	foot/feet

TABLE NPSA-5-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-5

AVERAGE SITE DEPTH TO GROUNDWATER: 27 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROFORM	1.9	25046	01/6/88
DIISOPROPYLMETHYL PHOSPHONATE	7.3	25046	12/15/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-5-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.9E+02	1.6E+02	4.6E-04	2.1E-03	2.6E-03	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.0E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	4.7E+05	2.8E+05	1.2E-06	1.6E-06	2.8E-06	1.8E-09
1,1,1-TRICHLOROETHANE	7.5E+05	1.8E+06	5.3E+05	8.0E-07	3.4E-07	1.1E-06	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.9E-02	0.0E+00	2.9E-02	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.2E-02	0.0E+00	1.2E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	8.8E-05	0.0E+00	8.8E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-5-4
EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.9E+02	1.6E+02	4.6E-04	2.1E-03	2.6E-03	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.0E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	4.7E+05	2.8E+05	1.2E-06	1.6E-06	2.8E-06	1.8E-09
1,1,1-TRICHLOROETHANE	7.5E+05	1.8E+06	5.3E+05	8.0E-07	3.4E-07	1.1E-06	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	2.9E-02	0.0E+00	2.9E-02	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	1.2E-02	0.0E+00	1.2E-02	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	8.8E-05	0.0E+00	8.8E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-6-7
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV	INDIRECT OSVI	INDIRECT ESVI	CUMULATIVE PPLV	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
BENZENE	8.6E+02	1.9E+02	1.9E+02	1.6E+02	4.6E-04	2.1E-03	2.6E-03	0.0E+00	0.0E+00
CHLOROFORM	4.0E+03	0.0E+00	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	3.0E-06	3.0E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	4.7E+05	4.7E+05	2.8E+05	1.2E-06	1.6E-06	2.8E-06	1.8E-09	1.8E-09
1,1,1-TRICHLOROETHANE	7.5E+05	1.8E+06	1.8E+06	5.3E+05	8.0E-07	3.4E-07	1.1E-06	0.0E+00	0.0E+00
ARSENIC	2.2E+01	0.0E+00	0.0E+00	2.2E+01	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00	0.0E+00
CADMIUM	4.5E+02	0.0E+00	0.0E+00	4.5E+02	2.9E-02	0.0E+00	2.9E-02	0.0E+00	0.0E+00
COPPER	4.2E+05	0.0E+00	0.0E+00	4.2E+05	1.7E-04	0.0E+00	1.7E-04	0.0E+00	0.0E+00
LEAD	1.5E+04	0.0E+00	0.0E+00	1.5E+04	1.2E-02	0.0E+00	1.2E-02	0.0E+00	0.0E+00
MERCURY	3.3E+03	0.0E+00	0.0E+00	3.3E+03	8.8E-05	0.0E+00	8.8E-05	0.0E+00	0.0E+00
ZINC	2.0E+06	0.0E+00	0.0E+00	2.0E+06	1.3E-04	0.0E+00	1.3E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-5-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	1.2E+02	2.9E+01	2.4E+01	3.3E-03	1.4E-02	1.7E-02	0.0E+00
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	4.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	1.7E+05	1.1E+05	2.7E-06	4.5E-06	7.3E-06	1.1E-08
1,1,1-TRICHLOROETHANE	3.2E+05	6.4E+05	2.1E+05	1.9E-06	9.4E-07	2.8E-06	0.0E+00
ARSENIC	3.9E+00	0.0E+00	3.9E+00	6.1E+01*	0.0E+00	6.1E+01*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	2.3E-01*	0.0E+00	2.3E-01*	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	2.9E-04	0.0E+00	2.9E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	2.1E-02	0.0E+00	2.1E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.5E-04	0.0E+00	1.5E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.5E-04	0.0E+00	2.5E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-5-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
BENZENE	1.1E+03	7.2E-01	7.1E-01	3.7E-04	5.6E-01*	5.6E-01*	0.0E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	6.4E-04
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	1.3E+03	1.3E+03	2.1E-06	5.9E-04	5.9E-04	1.1E-06
1,1,1-TRICHLOROETHANE	4.2E+05	3.2E+04	3.0E+04	1.4E-06	1.9E-05	2.0E-05	0.0E+00
ARSENIC	2.0E+01	0.0E+00	2.0E+01	1.2E+01*	0.0E+00	1.2E+01*	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	3.6E-02	0.0E+00	3.6E-02	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	4.0E-04	0.0E+00	4.0E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	2.9E-02	0.0E+00	2.9E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	2.1E-04	0.0E+00	2.1E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	3.3E-04	0.0E+00	3.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-5-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI EMC
ENZENE	6.7E+01	2.5E+01	7.2E-01	6.9E-01	6.0E-03	5.8E-01*	5.8E-01*	0.0E+00	0.0E+00
HLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	2.3E-05	1.9E-03
ISOPROPYLMETHYL PHOSPHONATE	6.8E+04	6.3E+04	3.9E+03	3.5E+03	1.1E-05	2.1E-04	2.2E-04	1.3E-08	1.1E-06
,1,1-TRICHLOROETHANE	7.8E+04	2.4E+05	9.6E+04	3.6E+04	7.7E-06	8.8E-06	1.6E-05	0.0E+00	0.0E+00
RSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	1.5E+02*	0.0E+00	1.5E+02*	0.0E+00	0.0E+00
ADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	1.7E+00*	0.0E+00	1.7E+00*	0.0E+00	0.0E+00
OPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	1.2E-03	0.0E+00	1.2E-03	0.0E+00	0.0E+00
EAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	8.7E-02	0.0E+00	8.7E-02	0.0E+00	0.0E+00
ERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	6.3E-04	0.0E+00	6.3E-04	0.0E+00	0.0E+00
INC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.9E-03	0.0E+00	1.9E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.6 SITE NPSA-6: UNDERGROUND SPILL AREA (formerly North Plants Complex; EBASCO, 1988a/ RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.6.1 Site-Specific Considerations

Figure NPSA-6-1 and Tables NPSA-6-1 and NPSA-6-2 depict the target contaminants for Site NPSA-6. Borings 28, 37, 40 through 42, 85/85B, 86/86B, 87, 87B, 88/88B, 89 through 91, and 91B were included in this exposure assessment, consistent with the North Plants SAR. This site encompasses the inferred area of an underground diesel fuel spill from a leaking pipeline, Buildings 1703 (Communications Demolition facility) and 1727 (Chemical Sump). The historical search conducted under the contamination assessment revealed that GB, GB by-products, and all chemicals associated with the chemical sewer system were suspected contaminants in Site NPSA-6 (EBASCO, 1988a/RIC 88256R05); however, most of these chemicals were not detected in soils during the Phase I and Phase II investigations. According to site history, no other chemicals from the RMA target contaminant lists were suspected to be present in Site NPSA-6 (EBASCO, 1988a/RIC 88256R05).

2.6.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-6 are depicted in Figure NPSA-6-1. Table NPSA-6-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-6-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.6.3 Site Exposure Summary

Tables NPSA-6-3 through NPSA-6-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-6 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative

quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

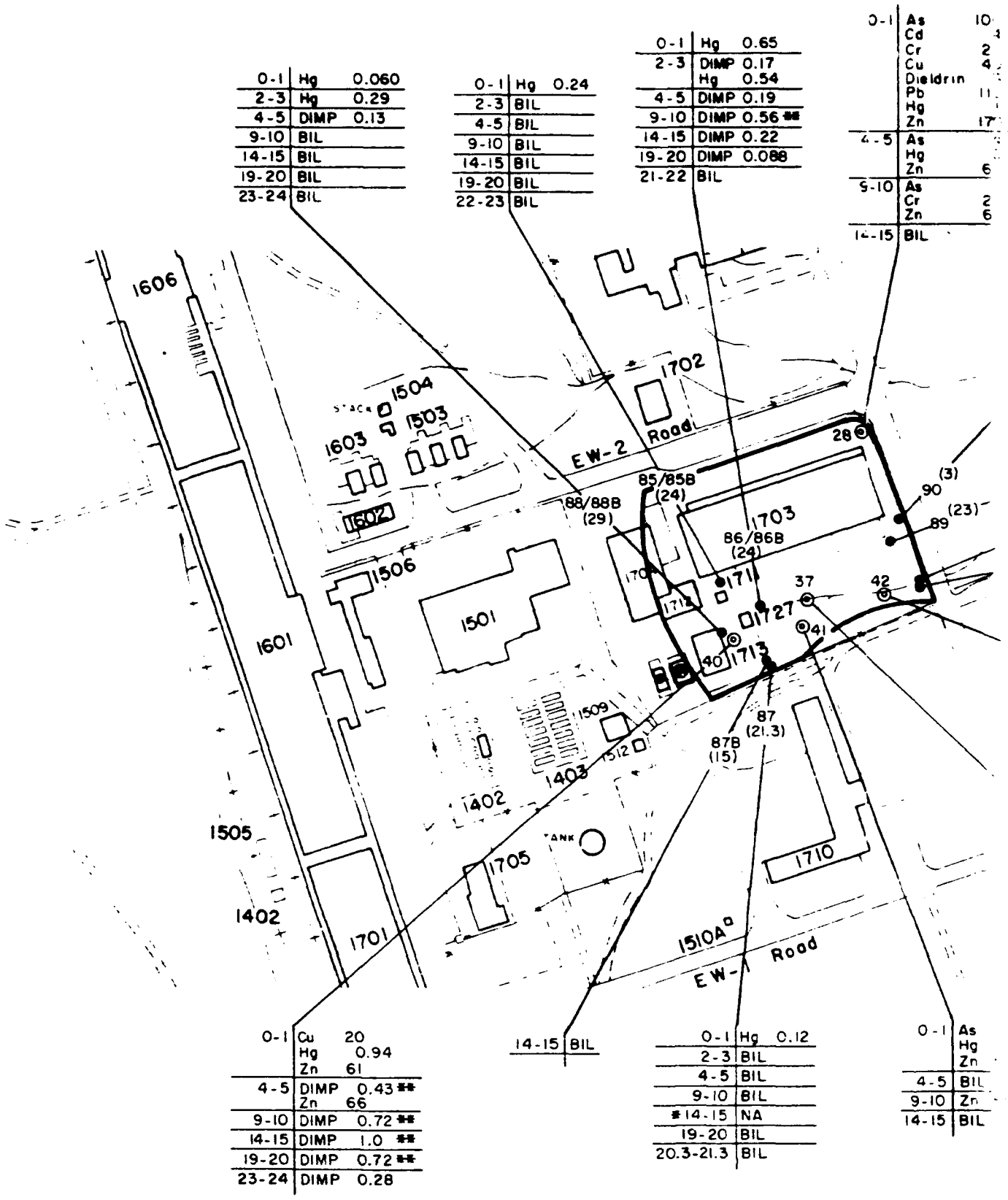
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Dieldrin	Direct	Direct	Direct	Direct	Dir/Ind
Arsenic	Direct	Direct	Direct	Direct	Direct
Aldrin	--	--	Direct	Cumulative	Direct
Benzene	--	--	--	Indirect	Indirect
Cadmium	--	--	--	--	Direct

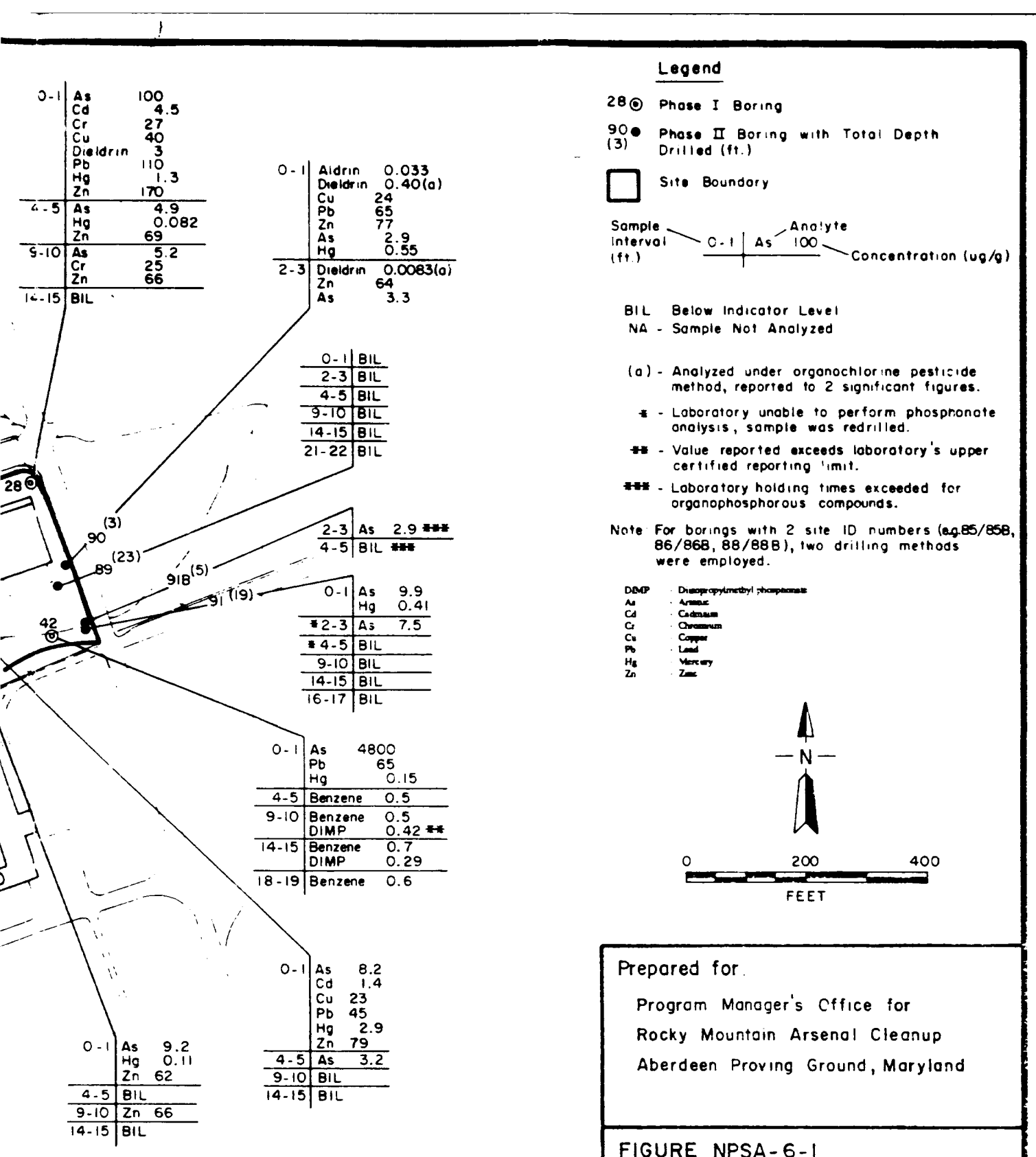
Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.
Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the direct and indirect pathways contribute to the exceedance of the cumulative PPLVs. It should be noted for Aldrin, the cummulative EI exceeds 0.1 for the Commercial Worker but the direct and indirect EIs do not exceed 0.1. Site NPSA-6 is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminant results in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- 1,1-Dichloroethylene (enclosed)


0-1 Hg 0.060
2-3 Hg 0.29
4-5 DIMP 0.13
9-10 BIL
14-15 BIL
19-20 BIL
23-24 BIL
0-1 Hg 0.24
2-3 BIL
4-5 BIL
9-10 BIL
14-15 BIL
19-20 BIL
22-23 BIL
0-1 Hg 0.65
2-3 DIMP 0.17
Hg 0.54
4-5 DIMP 0.19
9-10 DIMP 0.56 **
14-15 DIMP 0.22
19-20 DIMP 0.088
21-22 BIL
0-1 As 10
Cd
Cr 2
Cu 4
Dieldrin
Pb 11
Hg
Zn 17
4-5 As
Hg
Zn 6
9-10 As
Cr 2
Zn 6
14-15 BIL
1606
1504
1503
1603
1602
1702
Road
EW-2
28
(3)
90
(23)
89
85/85B
(24)
88/88B
(29)
1703
86/86B
(24)
1506
1501
1601
170
171
1712
37
42
1727
41
40
1713
1509
1512
87
(21.3)
87B
(15)
1403
1402
1505
1705
TANK
1710
1402
1701
1510A
EW-1
Road
0-1 Cu 20
Hg 0.94
Zn 61
4-5 DIMP 0.43 **
Zn 66
9-10 DIMP 0.72 **
14-15 DIMP 1.0 **
19-20 DIMP 0.72 **
23-24 DIMP 0.28
14-15 BIL
0-1 Hg 0.12
2-3 BIL
4-5 BIL
9-10 BIL
*14-15 NA
19-20 BIL
20.3-21.3 BIL
0-1 As
Hg
Zn
4-5 BIL
9-10 Zn
14-15 BIL



Legend

28 ◉ Phase I Boring

90 ● (3) Phase II Boring with Total Depth Drilled (ft.)

Site Boundary

Sample Interval (ft.) — 0-1 | As — Analyte; 100 — Concentration (ug/g)

BIL Below Indicator Level
NA - Sample Not Analyzed

(a) - Analyzed under organochlorine pesticide method, reported to 2 significant figures.

* - Laboratory unable to perform phosphonate analysis, sample was redrilled.

** - Value reported exceeds laboratory's upper certified reporting limit.

*** - Laboratory holding times exceeded for organophosphorous compounds.

Note: For borings with 2 site ID numbers (e.g. 85/858, 86/868, 88/888), two drilling methods were employed.

DIMP - Diisopropylmethyl phosphonate
As - Arsenic
Cd - Cadmium
Cr - Chromium
Cu - Copper
Pb - Lead
Hg - Mercury
Zn - Zinc

N

0 200 400

FEET

Prepared for

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-6-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-6-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-6

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Aldrin	0.033	0-1	90	0.033	0-1	90
Benzene	0.5	4-5	42	0.7	14-15	42
		9-10	42	--	--	--
Dieldrin	3	0-1	28	3	0-1	28
Diisopropylmethyl phosphonate	0.72 1/	9-10	40	1.0 1/	14-15	40
Arsenic	4800	0-1	42	--	--	--
Cadmium	4.5	0-1	28	--	--	--
Copper	40	0-1	28	--	--	--
Lead	110	0-1	28	--	--	--
Mercury	2.9	0-1	37	--	--	--
Zinc	170	0-1	28	--	--	--

1/ Value exceeds laboratory's upper certified reporting limit.

NPSA	North Plants Study Area
Max.	Maximum
ug/g	microgram per gram
ft	foot/feet

TABLE NPSA-6-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-6

AVERAGE SITE DEPTH TO GROUNDWATER: 29 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2.6	25055	02/8/89
1,1-DICHLOROETHYLENE	4.2	25055	02/8/89
1,1-DICHLOROETHANE	1.4	25055	02/8/89
1,2-DICHLOROETHANE	8.1	25044	12/16/88
BENZENE	1.6	25055	02/8/89
CARBON TETRACHLORIDE	6.1	25055	02/8/89
CHLOROFORM	230	25055	02/8/89
CHLOROPHENYLMETHYL SULFIDE	120	25044	01/8/88
CHLOROPHENYLMETHYL SULFOXIDE	310	25044	01/8/88
CHLOROPHENYLMETHYL SULFONE	610	25044	01/8/88
DIISOPROPYLMETHYL PHOSPHONATE	34	25044	05/25/88
DITHIANE	3.0	25044	01/8/88
DIELDRIN	0.046	25055	02/8/89
1,4-OXATHIANE	1.8	25044	01/8/88
TETRACHLOROETHYLENE	13	25055	02/8/89
TRICHLOROETHYLENE	7.5	25055	02/8/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-6-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	9.3E+04	1.5E+00	2.2E-02	3.5E-07	2.2E-02	0.0E+00
BENZENE	8.6E+02	8.7E+02	4.3E+02	5.8E-04	8.0E-04	1.4E-03	3.1E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.8E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.7E-09
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	7.1E-10
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	8.5E-06
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-03
DIELDRIN	1.6E+00	4.3E+04	1.6E+00	1.9E+00*	7.1E-05	1.9E+00*	2.0E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	3.6E+05	2.3E+05	1.1E-06	2.8E-06	3.8E-06	1.5E-09
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-05
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-09
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-05
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.2E+02*	0.0E+00	2.2E+02*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	1.0E-02	0.0E+00	1.0E-02	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.6E-05	0.0E+00	9.6E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-03	0.0E+00	7.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	8.8E-04	0.0E+00	8.8E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-6-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ALDRIN	1.5E+00	9.3E+04	1.5E+00	2.2E-02	3.5E-07	2.2E-02	0.0E+00
BENZENE	8.6E+02	8.7E+02	4.3E+02	5.8E-04	8.0E-04	1.4E-03	3.1E-06
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.0E-04
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	6.5E-05
CHLOROPHENYLMETHYL SULFIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-08
CHLOROPHENYLMETHYL SULFONE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.8E-09
CHLOROPHENYLMETHYL SULFOXIDE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	4.7E-09
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	7.1E-10
1,2-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	8.5E-06
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-03
DIELDRIN	1.6E+00	4.3E+04	1.6E+00	1.9E+00*	7.1E-05	1.9E+00*	2.0E-09
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	3.6E+05	2.3E+05	1.1E-06	2.8E-06	3.8E-06	1.5E-09
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+05	0.0E+00	2.5E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-05
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-09
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.2E-05
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.2E+02*	0.0E+00	2.2E+02*	0.0E+00
CADMIUM	4.5E+02	0.0E+00	4.5E+02	1.0E-02	0.0E+00	1.0E-02	0.0E+00
COPPER	4.2E+05	0.0E+00	4.2E+05	9.6E-05	0.0E+00	9.6E-05	0.0E+00
LEAD	1.5E+04	0.0E+00	1.5E+04	7.1E-03	0.0E+00	7.1E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	8.8E-04	0.0E+00	8.8E-04	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-6-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPW
ALDRIN	2.1E-01	6.2E+03	2.1E-01	1.6E-01*	5.3E-06	1.6E-01*	0.0E+00
BENZENE	1.2E+02	1.4E+02	6.3E+01	4.2E-03	5.2E-03	9.4E-03	4.6E-05
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	3.0E-03
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	9.8E-04
CHLOROPHENYLMETHYL SULFIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	5.1E-07
CHLOROPHENYLMETHYL SULFONE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	3.1E-08
CHLOROPHENYLMETHYL SULFOXIDE	7.0E+04	0.0E+00	7.0E+04	0.0E+00	0.0E+00	0.0E+00	3.0E-08
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	1.1E-08
1,2-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	1.3E-04
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-02
DIELDRIN	2.2E-01	2.8E+03	2.2E-01	1.4E+01*	1.1E-03	1.4E+01*	3.0E-08
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	5.6E+04	4.7E+04	2.6E-06	1.8E-05	2.0E-05	9.6E-09
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	1.1E+05	0.0E+00	1.1E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-04
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-08
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.9E-04
ARSENIC	3.9E+00	0.0E+00	3.9E+00	1.2E+03*	0.0E+00	1.2E+03*	0.0E+00
CADMIUM	5.8E+01	0.0E+00	5.8E+01	7.8E-02	0.0E+00	7.8E-02	0.0E+00
COPPER	2.5E+05	0.0E+00	2.5E+05	1.6E-04	0.0E+00	1.6E-04	0.0E+00
LEAD	9.2E+03	0.0E+00	9.2E+03	1.2E-02	0.0E+00	1.2E-02	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.5E-03	0.0E+00	1.5E-03	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.6E-04	0.0E+00	1.6E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-6-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ALDRIN	1.9E+00	4.0E-01	3.3E-01	1.7E-02	8.3E-02	1.0E-01*	0.0E+00
BENZENE	1.1E+03	6.0E-01	6.0E-01	4.6E-04	1.2E+00*	1.2E+00*	3.2E-03
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	2.1E-01
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	6.9E-02
CHLOROPHENYLMETHYL SULFIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	2.5E-04
CHLOROPHENYLMETHYL SULFONE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-05
CHLOROPHENYLMETHYL SULFOXIDE	9.1E+04	0.0E+00	9.1E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-05
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	7.5E-07
1,2-DICHLOROETHANE	3.5E+02	0.0E+00	3.5E+02	0.0E+00	0.0E+00	0.0E+00	9.0E-03
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	1.9E+00
DIELDRIN	2.0E+00	5.8E+01	1.9E+00	1.5E+00*	5.2E-02	1.6E+00*	2.1E-06
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	1.6E+02	1.6E+02	2.0E-06	6.1E-03	6.1E-03	4.7E-06
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	1.4E+05	0.0E+00	1.4E+05	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-02
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	9.6E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.3E-02
ARSENIC	2.0E+01	0.0E+00	2.0E+01	2.4E+02*	0.0E+00	2.4E+02*	0.0E+00
CADMIUM	3.6E+02	0.0E+00	3.6E+02	1.3E-02	0.0E+00	1.3E-02	0.0E+00
COPPER	1.8E+05	0.0E+00	1.8E+05	2.3E-04	0.0E+00	2.3E-04	0.0E+00
LEAD	6.5E+03	0.0E+00	6.5E+03	1.7E-02	0.0E+00	1.7E-02	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	2.1E-03	0.0E+00	2.1E-03	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.2E-04	0.0E+00	2.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-6-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
ALDRIN	1.2E-01	1.2E+04	4.0E-01	9.0E-02	2.8E-01*	8.3E-02	3.7E-01*	0.0E+00	0.0E+00
BENZENE	6.7E+01	1.2E+02	6.0E-01	5.9E-01	7.5E-03	1.2E+00*	1.2E+00*	2.3E-05	9.7E-03
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-03	6.4E-01
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	4.9E-04	2.1E-01
CHLOROPHENYLMETHYL SULFIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	5.9E-07	2.5E-04
CHLOROPHENYLMETHYL SULFONE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.6E-08	1.5E-05
CHLOROPHENYLMETHYL SULFOXIDE	1.7E+04	0.0E+00	0.0E+00	1.7E+04	0.0E+00	0.0E+00	0.0E+00	3.5E-08	1.5E-05
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	5.3E-09	2.3E-06
1,2-DICHLOROETHANE	2.2E+01	0.0E+00	0.0E+00	2.2E+01	0.0E+00	0.0E+00	0.0E+00	6.4E-05	2.7E-02
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	5.8E+00
DIELDRIN	1.2E-01	5.7E+03	1.9E+01	1.2E-01	2.5E+01*	1.6E-01*	2.5E+01*	1.5E-08	6.3E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	4.8E+04	1.6E+02	1.6E+02	1.1E-05	6.2E-03	6.2E-03	1.1E-08	4.7E-06
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,4-OXATHIANE	2.5E+04	0.0E+00	0.0E+00	2.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	8.4E-05	3.6E-02
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	2.3E-08	9.6E-06
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	9.3E-05	3.9E-02
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	3.0E+03*	0.0E+00	3.0E+03*	0.0E+00	0.0E+00
CADMIUM	7.6E+00	0.0E+00	0.0E+00	7.6E+00	5.9E-01*	0.0E+00	5.9E-01*	0.0E+00	0.0E+00
COPPER	5.7E+04	0.0E+00	0.0E+00	5.7E+04	7.0E-04	0.0E+00	7.0E-04	0.0E+00	0.0E+00
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	5.0E-02	0.0E+00	5.0E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	6.3E-03	0.0E+00	6.3E-03	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.2E-03	0.0E+00	1.2E-03	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.7 SITE NPSA-7: SURFACE SPILL AREA (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.7.1 Site-Specific Considerations

Figure NPSA-7-1 and Tables NPSA-7-1 and NPSA-7-2 depict the target contaminants for Site NPSA-7. Borings 47, 47B, and 93 were included in this exposure assessment, consistent with the North Plants SAR. This site occupies the surface diesel fuel spill area southeast of Building 1705. According to the site history, no chemicals on the RMA target contaminant list were suspected to be present on Site NPSA-7 (EBASCO, 1988a/RIC 88256R05).

2.7.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and configurations of the target contaminants that were detected in Site NPSA-7 are depicted in Figure NPSA-7-1. Table NPSA-7-1 shows that no target contaminants were found above the indicator level. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-7-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

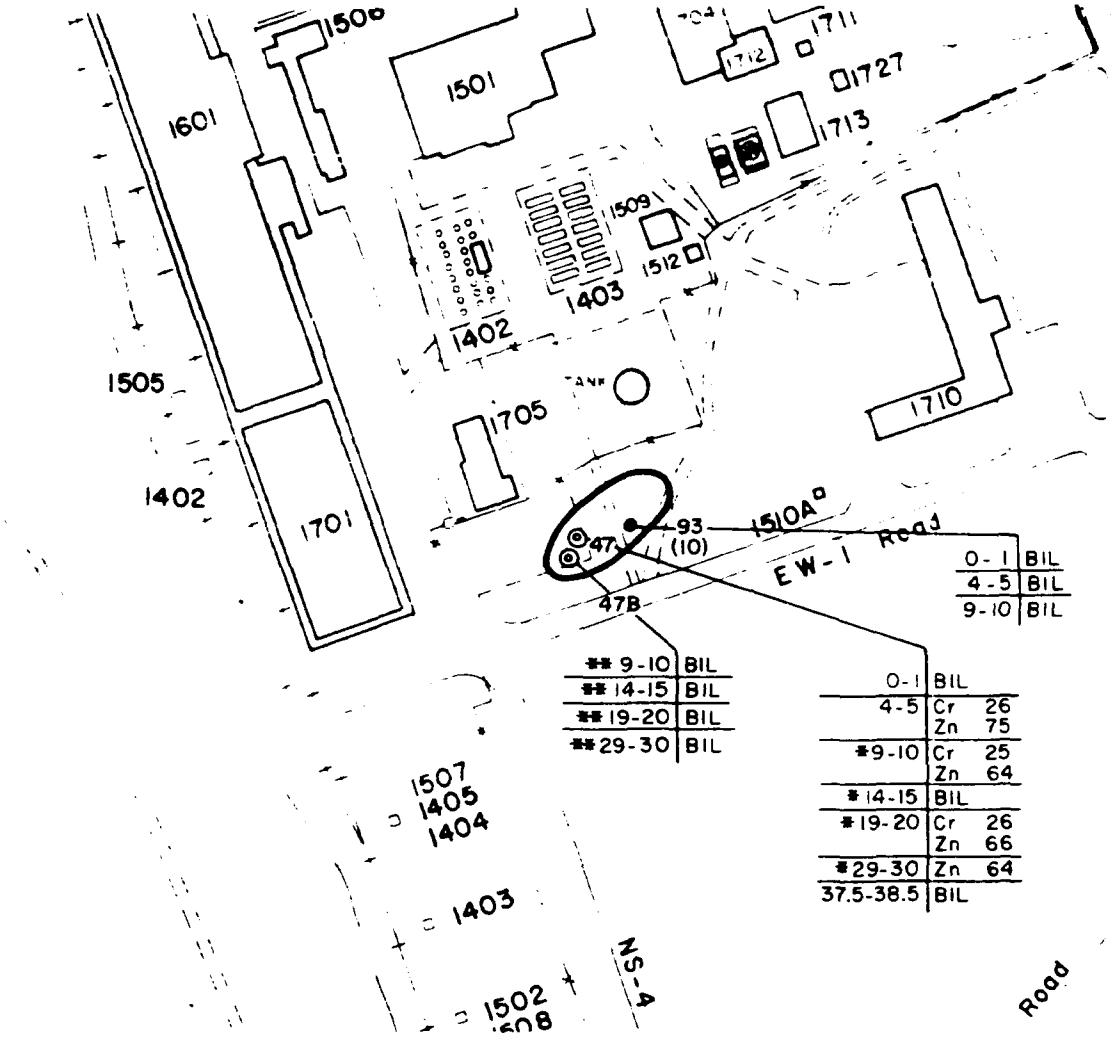
2.7.3 Site Exposure Summary

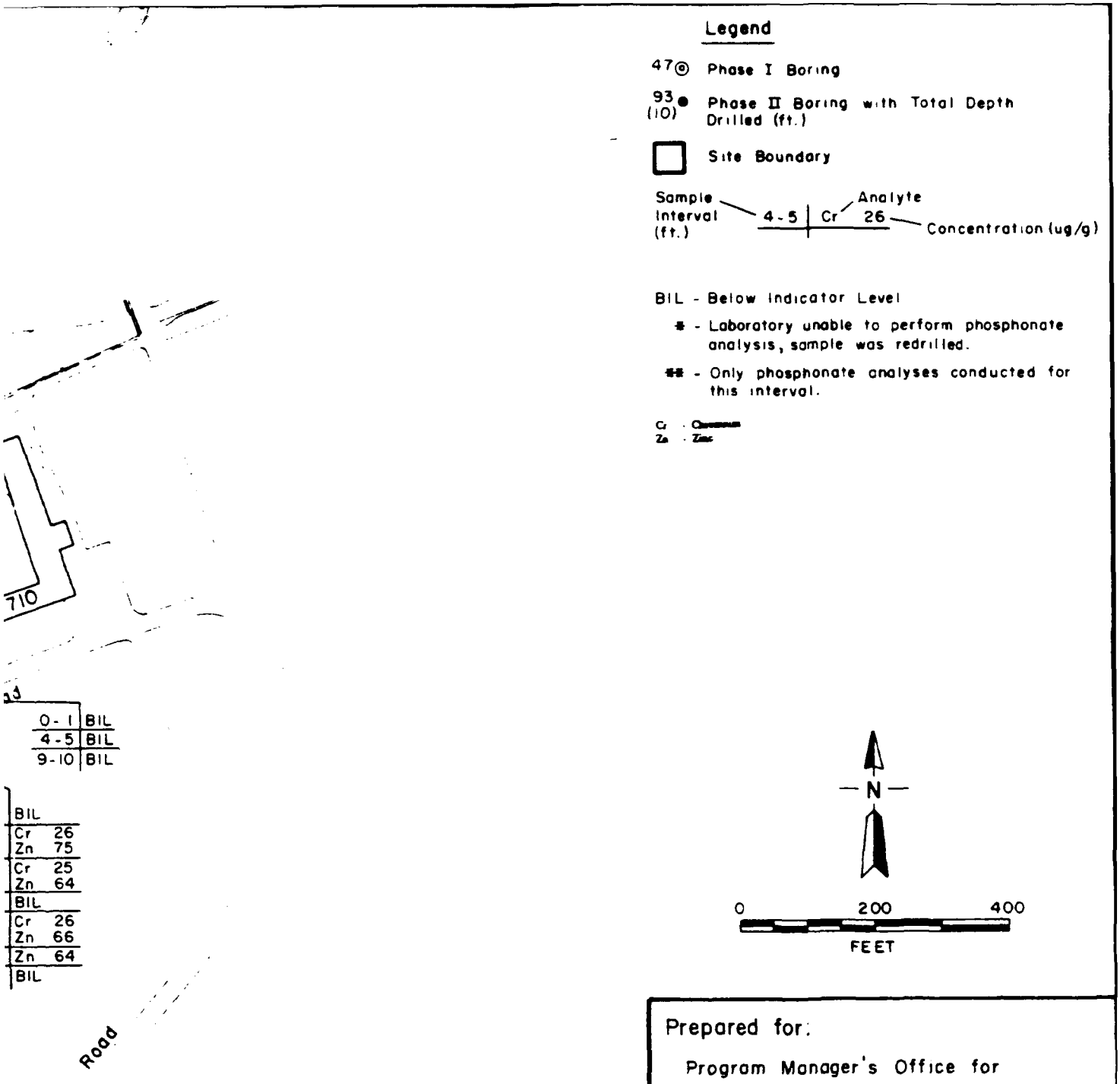
Tables NPSA-7-3 through NPSA-7-7 present Draft PPLVs and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-7 is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity.

No soil contaminants are shown on Table NPSA-7-1, therefore, no COCs were identified for this site. Site NPSA-7 is designated as a Priority 2 site.

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- 1,1-Dichloroethylene (enclosed)


1500
1501
1601
1711
1712
1727
1713
1509
1512
1403
1402
1505
1705
1710
1701
1402
93
(10)
1510A
47
47B
Road
EW-1
0-1 BIL
4-5 BIL
9-10 BIL
** 9-10 BIL
** 14-15 BIL
** 19-20 BIL
**29-30 BIL
0-1 BIL
4-5 Cr 26
Zn 75
*9-10 Cr 25
Zn 64
*14-15 BIL
*19-20 Cr 26
Zn 66
*29-30 Zn 64
37.5-38.5 BIL
1507
1405
1404
1403
1502
NS-4
Road



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-7-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE NPSA-7-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-7

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
None	--	--	--	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE NPSA-7-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-7

AVERAGE SITE DEPTH TO GROUNDWATER: 36 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2.5	25042	05/25/88
1,1-DICHLOROETHYLENE	8.9	25042	05/25/88
1,1-DICHLOROETHANE	1.7	25042	05/25/88
CARBON TETRACHLORIDE	65	25042	05/25/88
CHLOROFORM	470	25042	05/25/88
DIISOPROPYLMETHYL PHOSPHONATE	40	25042	05/25/88
TETRACHLOROETHYLENE	4.5	25052	02/8/89
TRICHLOROETHYLENE	100	25042	05/25/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 199C

NPSA-7-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	9.8E-12
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.3E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-11
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.2E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.8E-06

NPSA-7-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.5E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	9.8E-12
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.3E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-11
TETRACHLOROETHYLENE	5.1E+02	0.0E+00	5.1E+02	0.0E+00	0.0E+00	0.0E+00	4.3E-08
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.2E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.8E-06

NPSA-7-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	3.6E-04
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.2E-05
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	1.5E-10
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-04
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-10
TETRACHLOROETHYLENE	7.1E+01	0.0E+00	7.1E+01	0.0E+00	0.0E+00	0.0E+00	6.4E-07
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-10
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	2.8E-05

NPSA-7-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.7E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-01
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	6.9E-07
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	3.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	4.1E-06
TETRACHLOROETHYLENE	6.5E+02	0.0E+00	6.5E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-03
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	6.8E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.3E-01

NPSA-7-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-04	5.1E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-05	3.2E-01
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	7.4E-11	2.1E-06
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	3.2E-04	9.0E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-10	4.1E-06
TETRACHLOROETHYLENE	4.1E+01	0.0E+00	0.0E+00	4.1E+01	0.0E+00	0.0E+00	0.0E+00	3.2E-07	9.1E-03
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	2.4E-10	6.8E-06
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-05	3.9E-01

2.8 SITE NPSA-8a: DRAINAGE DITCH (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.8.1 Site-Specific Considerations

Figure NPSA-8a-1 and Table NPSA-8a-1 depict the target contaminants for Site NPSA-8a. Borings 14 and 57 were included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-8a (EBASCO, 1988a/RIC 88256R05).

2.8.2 Spatial Distribution of Measured Contaminant Concentrations

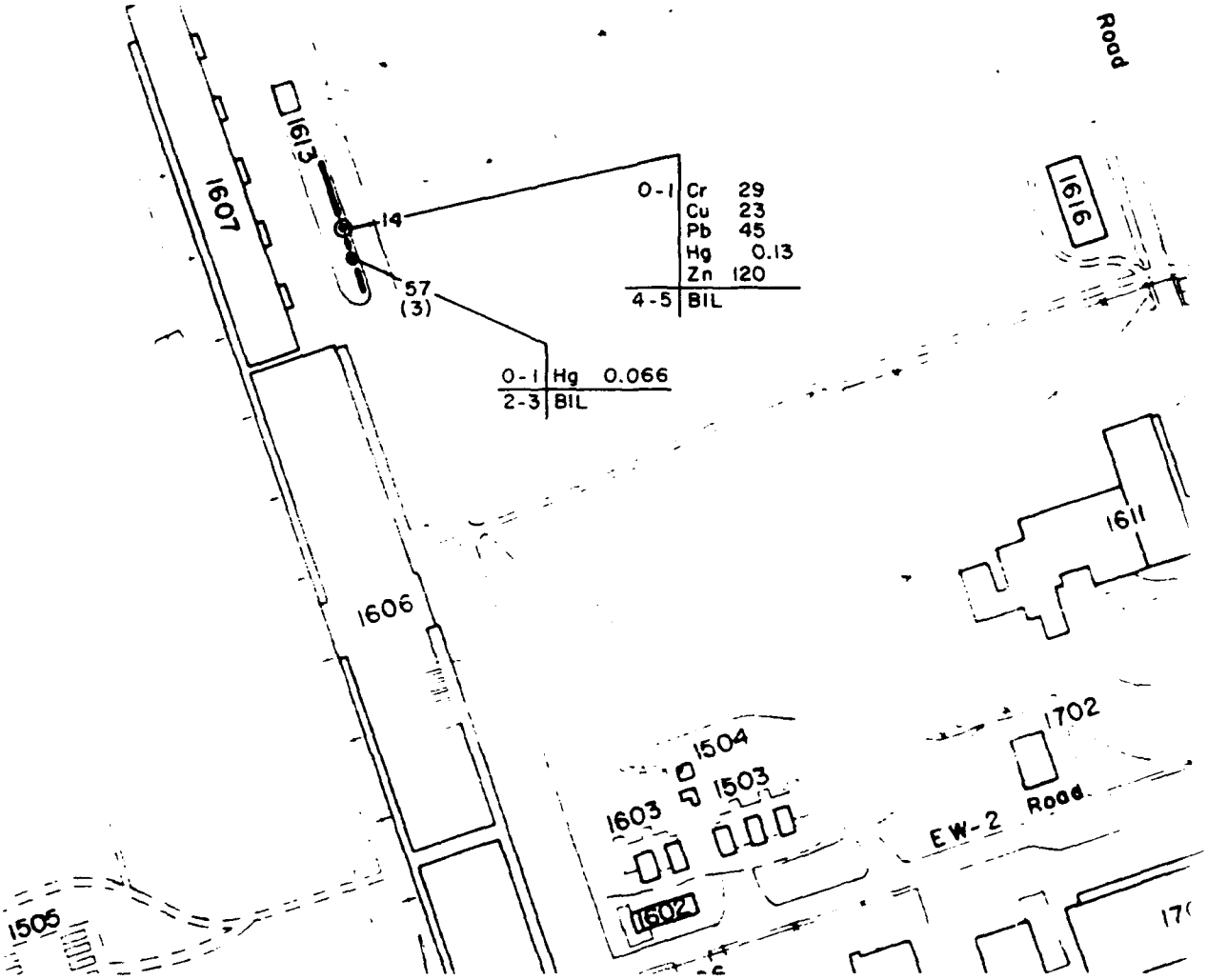
The locations and concentrations of the target contaminants that were detected in Site NPSA-8a are shown in Figure NPSA-8a-1. Table NPSA-8a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Based on available groundwater data from the first quarter 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

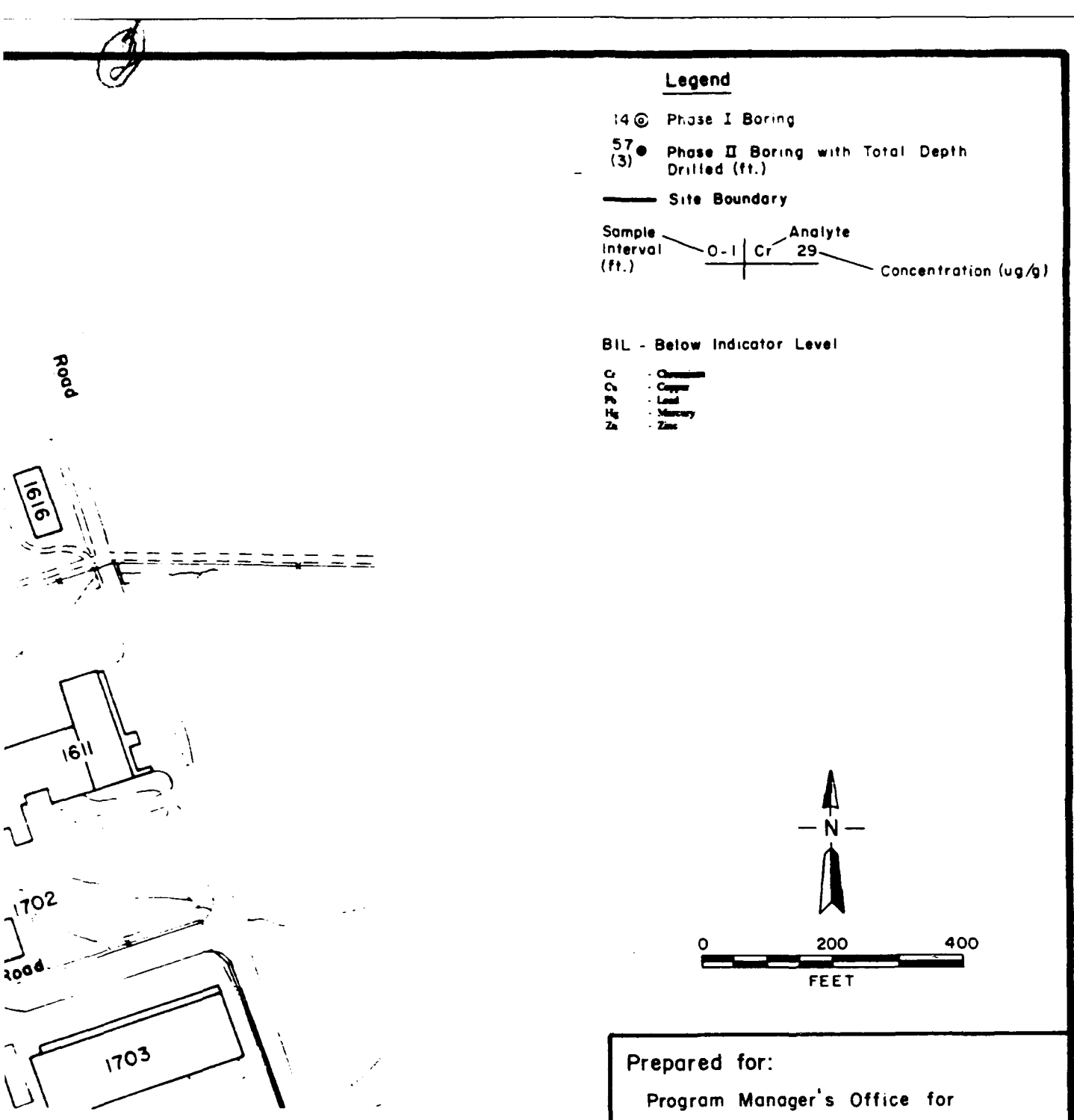
2.8.3 Site Exposure Summary

Tables NPSA-8a-2 through NPSA-8a-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
None	--	--	--	--	--

The results of the soil exposure summary indicate that there are no COCs. Site NPSA-8a is designated as a Priority 2 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).


1613
1607
14
57
(3)
0-1 Cr 29
Cu 23
Pb 45
Hg 0.13
Zn 120
4-5 BIL
0-1 Hg 0.066
2-3 BIL
1616
Road
1611
1606
1504
1503
1603
1702
EW-2
Road
1602
1505



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-8a-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-8a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-8a

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Lead	45	0-1	14	--	--	--
Mercury	0.13	0-1	14	--	--	--
Zinc	120	0-1	14	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

NPSA-8a-2

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
LEAD	1.5E+04	0.0E+00	1.5E+04	2.9E-03	0.0E+00	2.9E-03	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	3.9E-05	0.0E+00	3.9E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8a-3

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
LEAD	1.5E+04	0.0E+00	1.5E+04	2.9E-03	0.0E+00	2.9E-03	0.0E+00
MERCURY	3.3E+03	0.0E 00	3.3E+03	3.9E-05	0.0E+00	3.9E-05	0.0E+00
ZINC	2.0E+06	0 0E+00	2.0E+06	6.0E-05	0.0E+00	6.0E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8a-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
LEAD	9.2E+03	0.0E+00	9.2E+03	4.9E-03	0.0E+00	4.9E-03	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	6.6E-05	0.0E+00	6.6E-05	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8a-5

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
LEAD	6.5E+03	0.0E+00	6.5E+03	6.9E-03	0.0E+00	6.9E-03	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	9.3E-05	0.0E+00	9.3E-05	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	1.5E-04	0.0E+00	1.5E-04	0.0E+00

NPSA-8a-6

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
LEAD	2.2E+03	0.0E+00	0.0E+00	2.2E+03	2.1E-02	0.0E+00	2.1E-02	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	2.8E-04	0.0E+00	2.8E-04	0.0E+00	0.0E+00
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	8.6E-04	0.0E+00	8.6E-04	0.0E+00	0.0E+00

2.9 SITE NPSA-8b: DRAINAGE DITCH (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.9.1 Site-Specific Considerations

Figure NPSA-8b-1 and Tables NPSA-8b-1 and NPSA-8b-2 depict the target contaminants for Site NPSA-8b. Borings 7, 7B, 10, 12, 17, 54, 55, and 58 were included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-8b (EBASCO, 1988a/RIC 88256R05).

2.9.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-8b are shown in Figure NPSA-8b-1. Table NPSA-8b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-8b-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.9.3 Site Exposure Summary

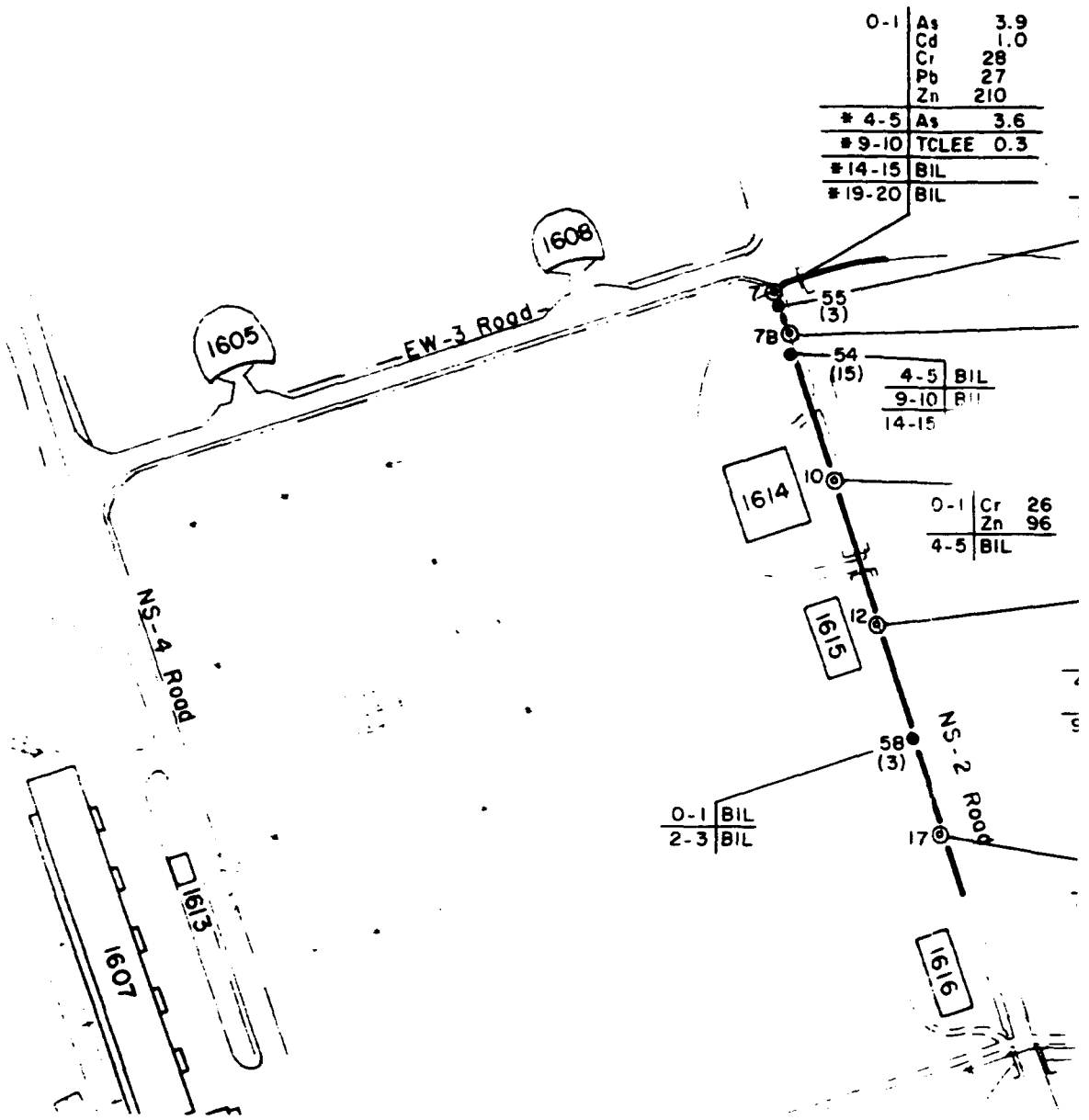
Tables NPSA-8b-3 through NPSA-8b-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-8b is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

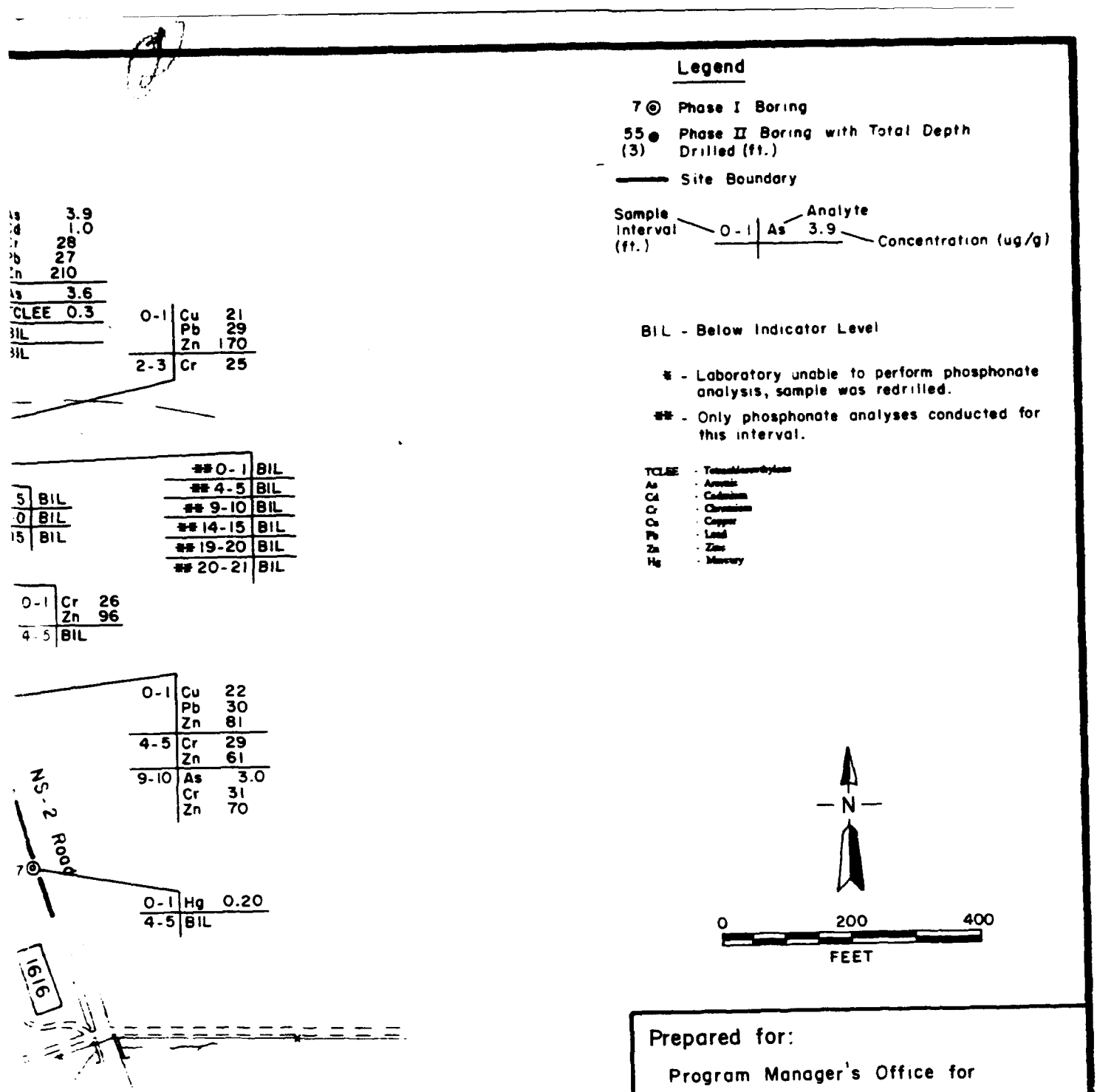
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
None	--	--	--	--	--

The results of the soil exposure summary indicate that there are no COCs. Site NPSA-8b is designated as a Priority 2 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- 1,1-Dichloroethylene (enclosed)


0-1 As 3.9
Cd 1.0
Cr 28
Pb 27
Zn 210
* 4-5 As 3.6
* 9-10 TCLEE 0.3
* 14-15 BIL
* 19-20 BIL
1608
1605
EW-3 Road
55
(3)
7B
54
(15)
4-5 BIL
9-10 BIL
14-15
1614
10
0-1 Cr 26
Zn 96
4-5 BIL
NS-4 Road
1615
12
58
(3)
NS-2 Road
0-1 BIL
2-3 BIL
17
1613
1607
1616



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-8b-1
Phase I and Phase II Analytes Detected Within or Above Indicator Levels
Rocky Mountain Arsenal
Prepared by: Ebasco Services Incorporated

TABLE NPSA-8b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-8b

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Tetrachloroethylene	0.3	9-10	7	0.3	9-10	7
Mercury	0.20	0-1	17	--	--	--
Zinc	210	0-1	7	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

TABLE NPSA-8b-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-8b

AVERAGE SITE DEPTH TO GROUNDWATER: 36 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	0.97	25054	02/8/89
1,1-DICHLOROETHYLENE	1.2	25054	02/8/89
CARBON TETRACHLORIDE	3.6	25054	02/8/89
CHLOROFORM	7.1	25048	01/4/89
CHLOROBENZENE	1.1	25048	01/4/89
DIBROMOCHLOROPROPANE	5.2	25048	01/4/89
DIISOPROPYLMETHYL PHOSPHONATE	GT 200	25054	02/8/89
DITHIANE	1.6	25048	06/2/88
TETRACHLOROETHYLENE	1.9	25054	02/8/89
TRICHLOROETHYLENE	1.8	25054	02/8/89

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-8b-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.1E-07
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.2E-11
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.0E-09
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-08
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-11
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	6.5E+06	5.1E+02	5.9E-04	4.6E-08	5.9E-04	5.5E-09
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.9E-12
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.0E-08
MERCURY	3.3E+03	0.0E+00	3.3E+03	6.0E-05	0.0E+00	6.0E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8b-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	4.1E-07
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	6.2E-11
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	7.0E-09
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	7.1E-08
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	1.8E-06
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	3.0E-11
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	5.1E+02	6.5E+06	5.1E+02	5.9E-04	4.6E-08	5.9E-04	5.5E-09
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.9E-12
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	1.0E-08
MERCURY	3.3E+03	0.0E+00	3.3E+03	6.0E-05	0.0E+00	6.0E-05	0.0E+00
ZINC	2.0E+06	0.0E+00	2.0E+06	1.1E-04	0.0E+00	1.1E-04	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8b-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	6.1E-06
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	4.0E-10
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-07
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-05
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.9E-10
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	7.1E+01	1.0E+06	7.1E+01	4.2E-03	3.0E-07	4.2E-03	8.4E-08
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.5E-11
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-07
MERCURY	2.0E+03	0.0E+00	2.0E+03	1.0E-04	0.0E+00	1.0E-04	0.0E+00
ZINC	1.1E+06	0.0E+00	1.1E+06	2.0E-04	0.0E+00	2.0E-04	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-8b-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	9.3E-02
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	4.3E-05
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-02
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	4.2E-01
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	2.1E-05
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TETRACHLOROETHYLENE	6.5E+02	1.3E+01	1.2E+01	4.6E-04	2.4E-02	2.4E-02	1.3E-03
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	2.6E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	2.3E-03
MERCURY	1.4E+03	0.0E+00	1.4E+03	1.4E-04	0.0E+00	1.4E-04	0.0E+00
ZINC	7.8E+05	0.0E+00	7.8E+05	2.7E-04	0.0E+00	2.7E-04	0.0E+00

NPSA-8b-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

ITAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	3.0E-06	2.8E-01
IENZENE	1.5E+04	0.0E+00	0.8E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	4.7E-10	4.3E-05
'ORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	5.2E-08	4.8E-03
)CHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-07	4.9E-02
:HLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-05	1.2E+00
IOPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	2.2E-10	2.1E-05
IE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ILOROETHYLENE	4.1E+01	8.7E+05	1.3E+01	9.6E+00	7.3E-03	2.4E-02	3.1E-02	4.2E-08	3.8E-03
TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	2.9E-11	2.6E-06
)ROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	7.6E-08	6.9E-03
	4.6E+02	0.0E+00	0.0E+00	4.6E+02	4.3E-04	0.0E+00	4.3E-04	0.0E+00	0.0E+00
	1.4E+05	0.0E+00	0.0E+00	1.4E+05	1.5E-03	0.0E+00	1.5E-03	0.0E+00	0.0E+00

2.10 SITE NPSA-8c: DRAINAGE DITCH (formerly Section 25 - Nonresource Area; ESE, 1988a/RIC 88063R09 and ESE, 1988b/RIC 88063R09A)

2.10.1 Site-Specific Considerations

Figure NPSA-8c-1 and Tables NPSA-8c-1 and NPSA-8c-2 depict the target contaminants for Site NPSA-8c. Borings 5131, 5135, 5146, 5513, 5573, and 5576 were included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-8c (ESE, 1988a/RIC 88063R09).

2.10.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-8c are depicted in Figure NPSA-8c-1. Table NPSA-8c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Table NPSA-8c-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.10.3 Site Exposure Summary

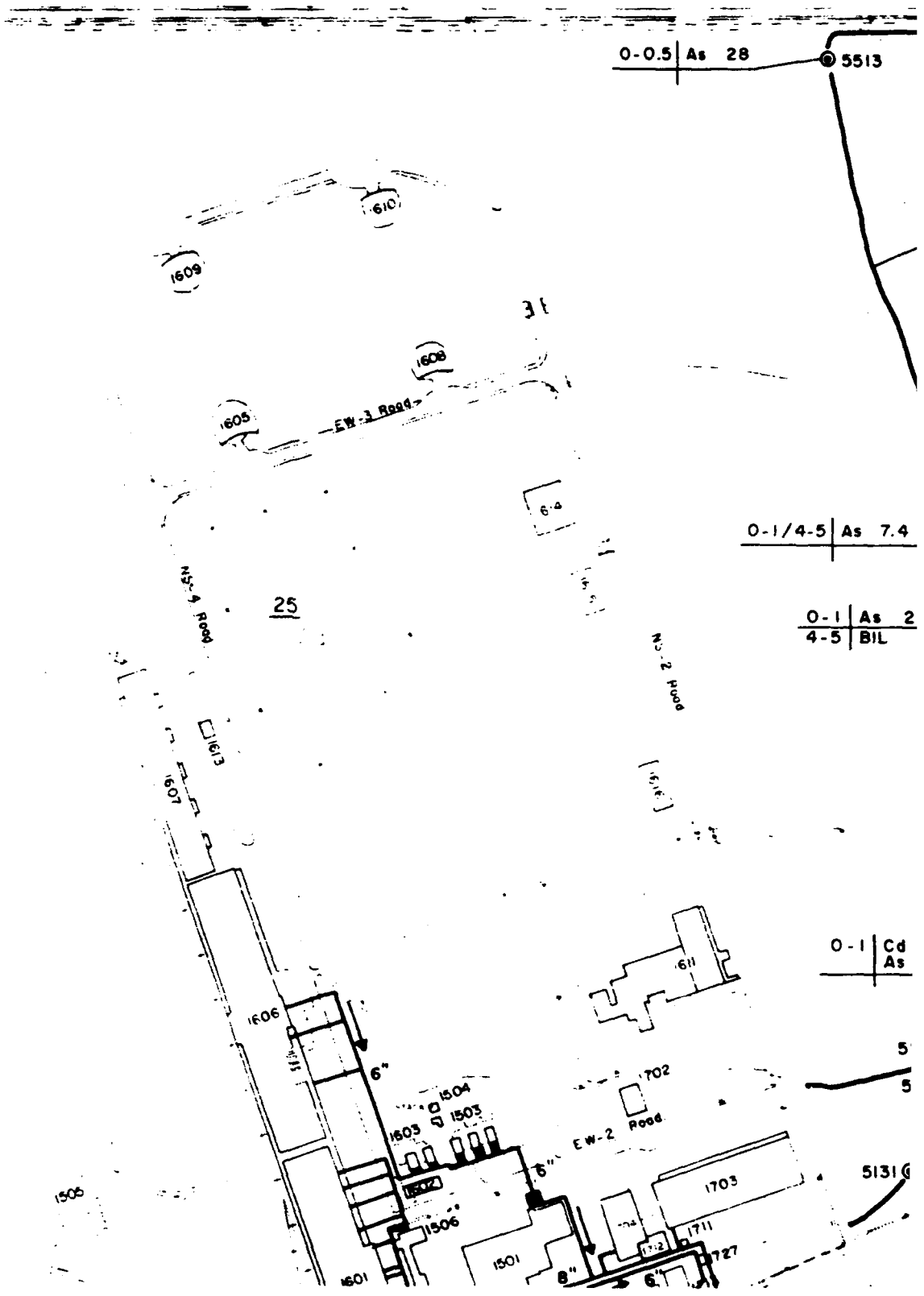
Tables NPSA-8c-3 through NPSA-8c-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-8c is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

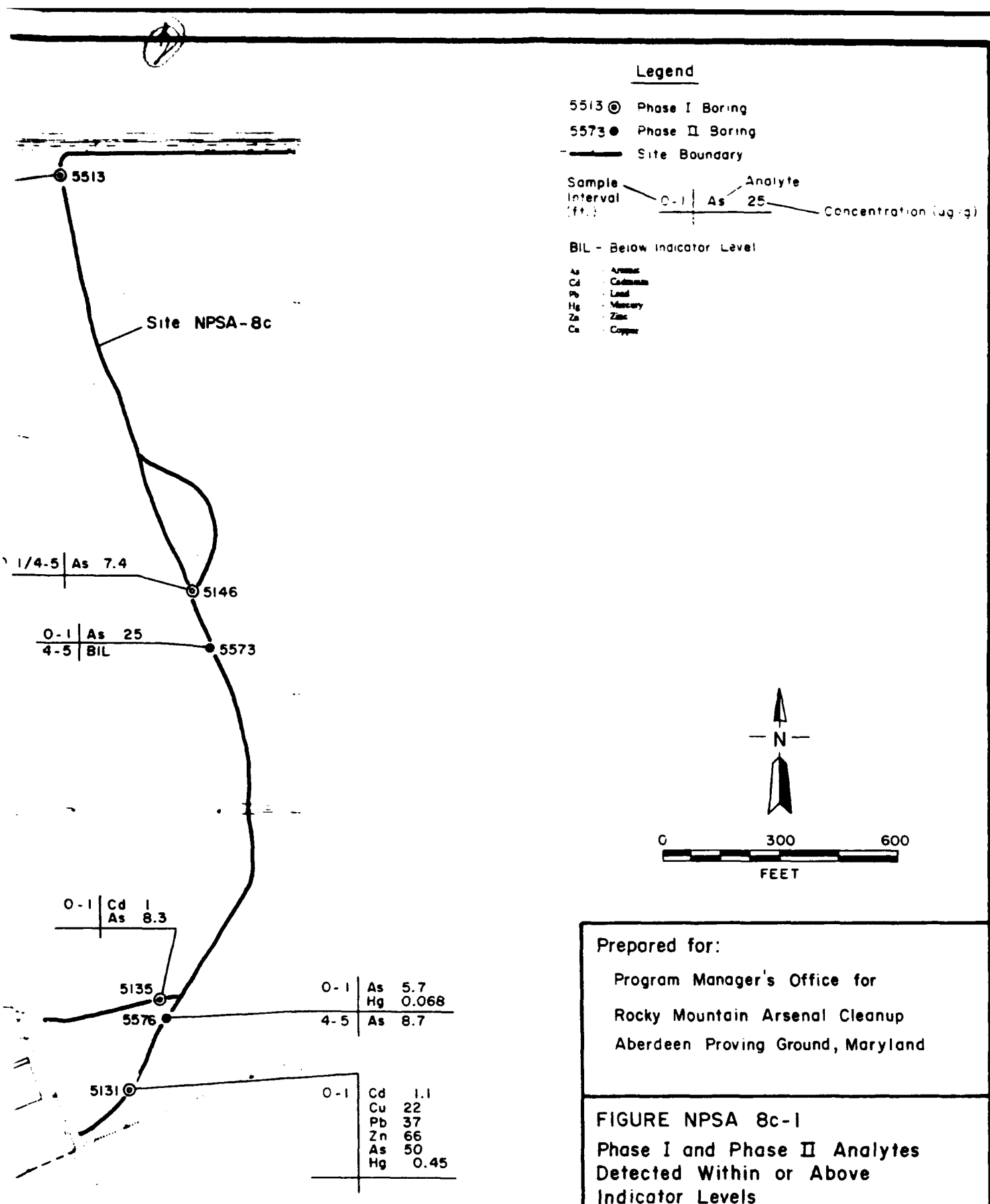
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Arsenic	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-8c is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

No groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by VEI values less than 1.


0-0.5 | As 28
5513
1610
1609
1608
1605
EW-3 Road
6-4
0-1/4-5 | As 7.4
25
NS-4 Road
0-1 | As 2
4-5 | BIL
NS-2 Road
1613
1607
1612
0-1 | Cd
As
1611
1606
6"
1504
1503
1603
1702
EW-2 Road
6"
1703
1711
1506
1501
1727
8"
6"
1601
1505



Prepared for:

Program Manager's Office for

Rocky Mountain Arsenal Cleanup

Aberdeen Proving Ground, Maryland

FIGURE NPSA 8c-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-8c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-8c

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Arsenic	50	0-1	5131	--	--	--
Mercury	0.45	0-1	5131	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g *microgram per gram*
ft foot/feet

TABLE NPSA-8c-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-8c

AVERAGE SITE DEPTH TO GROUNDWATER: 35 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
CHLOROFORM	7.1	25048	01/4/89
CHLOROBENZENE	1.1	25048	01/4/89
DIBROMOCHLOROPROPANE	5.2	25048	01/4/89
DIISOPROPYLMETHYL PHOSPHONATE	3.9	25048	01/4/89
DITHIANE	1.6	25048	06/2/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-8c-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.5E-10
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.5E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	9.6E-07
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-12
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.3E+00*	0.0E+00	2.3E+00*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.4E-04	0.0E+00	1.4E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-8c-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHLOROBENZENE	1.6E+05	0.0E+00	1.6E+05	0.0E+00	0.0E+00	0.0E+00	8.5E-10
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	9.5E-08
DIBROMOCHLOROPROPANE	1.8E+01	0.0E+00	1.8E+01	0.0E+00	0.0E+00	0.0E+00	9.6E-07
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	7.9E-12
DITHIANE	8.3E+04	0.0E+00	8.3E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ARSENIC	2.2E+01	0.0E+00	2.2E+01	2.3E+00*	0.0E+00	2.3E+00*	0.0E+00
MERCURY	3.3E+03	0.0E+00	3.3E+03	1.4E-04	0.0E+00	1.4E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-8c-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHLOROBENZENE	6.8E+04	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	5.5E-09
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	1.4E-06
DIBROMOCHLOROPROPANE	2.5E+00	0.0E+00	2.5E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	5.1E-11
DITHIANE	3.5E+04	0.0E+00	3.5E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ARSENIC	3.9E+00	0.0E+00	3.9E+00	1.3E+01*	0.0E+00	1.3E+01*	0.0E+00
MERCURY	2.0E+03	0.0E+00	2.0E+03	2.3E-04	0.0E+00	2.3E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-8c-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
CHLOROBENZENE	8.8E+04	0.0E+00	8.8E+04	0.0E+00	0.0E+00	0.0E+00	4.4E-05
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.7E-03
DIBROMOCHLOROPROPANE	2.3E+01	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	1.7E-02
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	4.1E-07
DITHIANE	4.6E+04	0.0E+00	4.6E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ARSENIC	2.0E+01	0.0E+00	2.0E+01	2.5E+00*	0.0E+00	2.5E+00*	0.0E+00
MERCURY	1.4E+03	0.0E+00	1.4E+03	3.2E-04	0.0E+00	3.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-8c-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
CHLOROBENZENE	1.5E+04	0.0E+00	0.0E+00	1.5E+04	0.0E+00	0.0E+00	0.0E+00	6.3E-09	4.4E-05
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	7.1E-07	5.0E-03
DIBROMOCHLOROPROPANE	1.4E+00	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-06	5.0E-02
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	5.9E-11	4.1E-07
DITHIANE	8.5E+03	0.0E+00	0.0E+00	8.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ARSENIC	1.6E+00	0.0E+00	0.0E+00	1.6E+00	3.1E+01*	0.0E+00	3.1E+01*	0.0E+00	0.0E+00
MERCURY	4.6E+02	0.0E+00	0.0E+00	4.6E+02	9.8E-04	0.0E+00	9.8E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.11 SITE NPSA-9a: RAILROAD TRACKS (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.11.1 Site-Specific Considerations

Figure NPSA-9a-1 and Table NPSA-9a-1 depict the target contaminants for Site NPSA-9a. Borings 21 and 61 were included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9a (EBASCO, 1988a/RIC 88256R05).

2.11.2 Spatial Distribution of Measured Contaminant Concentrations

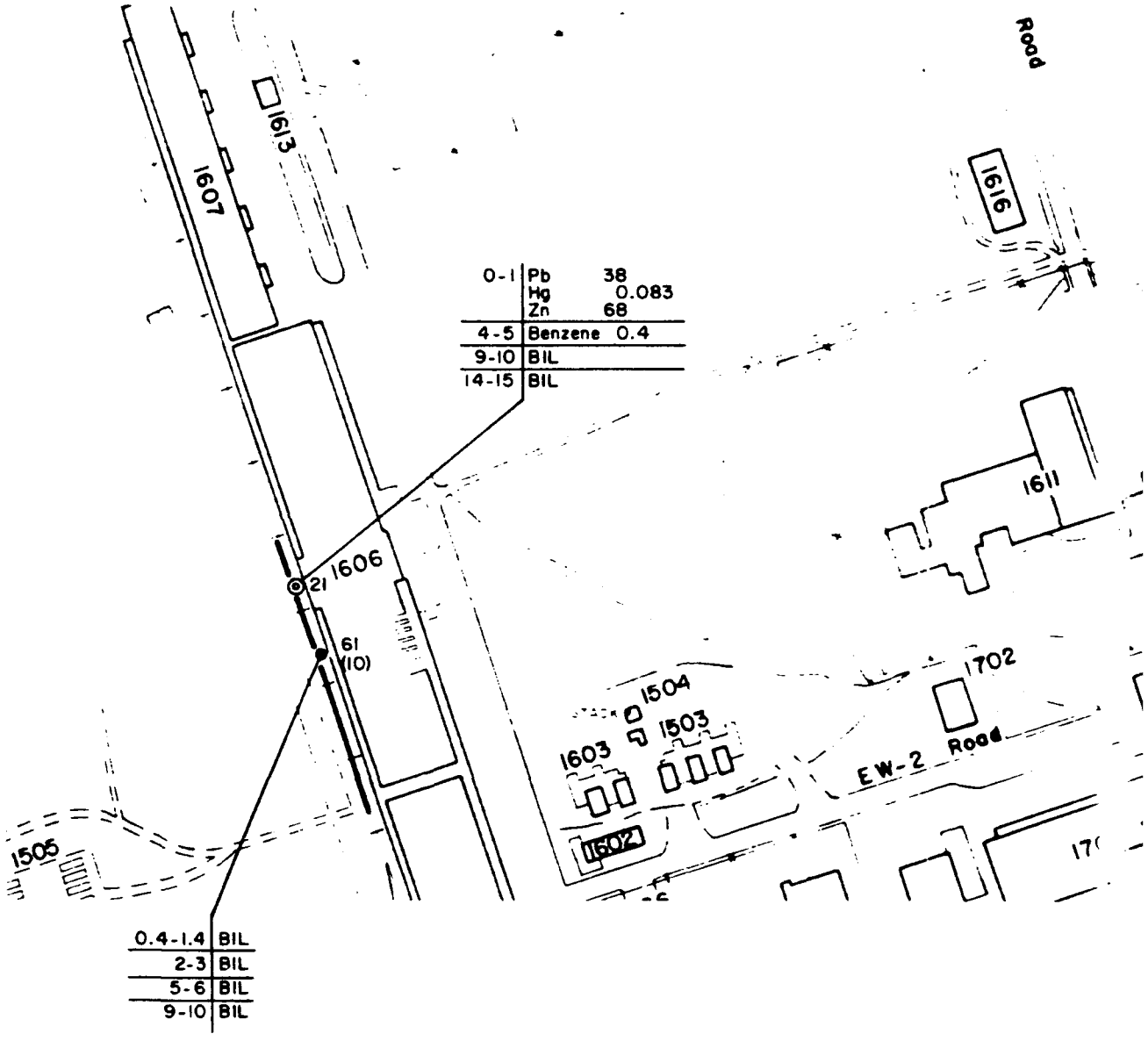
The locations and concentrations of the target contaminants that were detected in Site NPSA-9a are depicted in Figure NPSA-9a-1. Table NPSA-9a-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Based on available groundwater data from the first quarter 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

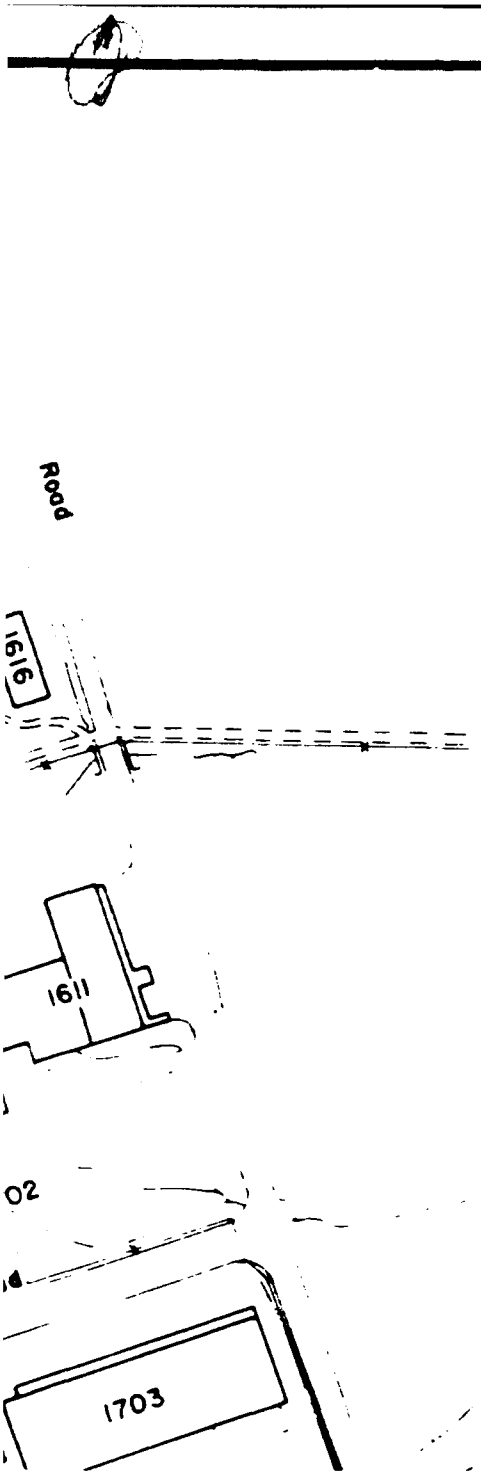
2.11.3 Site Exposure Summary

Tables NPSA-9a-2 through NPSA-9a-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
None	--	--	--	--	--

The results of the soil exposure summary indicate that there are no COCs. Site NPSA-9a is designated as a Priority 2 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).


1607
1613
1616
Road
0-1 Pb 38
Hg 0.083
Zn 68
4-5 Benzene 0.4
9-10 BIL
14-15 BIL
1611
21 1606
61
(10)
1504
1503
1603
1702
EW-2 Road
1602
1505
0.4-1.4 BIL
2-3 BIL
5-6 BIL
9-10 BIL



Legend

21 ◉ Phase I Boring

61 (10) ● Phase II Boring with Total Depth Drilled (ft.)

Site Boundary

Sample Interval (ft.) — 0-1 | Pb 38 — Analyte; Concentration (ug/g)

BIL - Below Indicator Level

Pb : Lead
Hg : Mercury
Zn : Zinc

N

0 200 400

FEET

Prepared for.

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9a-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-9a-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-9a

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Benzene	0.4	4-5	21	0.4	4-5	21

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

NPSA-9a-2
EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.7E+05	8.6E+02	4.6E-04	2.3E-06	4.7E-04	0.0E+00

NPSA-9a-3

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	1.7E+05	8.6E+02	4.6E-04	2.3E-06	4.7E-04	0.0E+00

NPSA-9a-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	1.2E+02	2.7E+04	1.2E+02	3.3E-03	1.5E-05	3.4E-03	0.0E+00

NPSA-9a-5

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
BENZENE	1.1E+03	2.5E+01	2.5E+01	3.7E-04	1.6E-02	1.6E-02	0.0E+00

NPSA-9a-6

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
BENZENE	6.7E+01	2.3E+04	2.5E+01	1.8E+01	6.0E-03	1.6E-02	2.2E-02	0.0E+00	0.0E+00

2.12 SITE NPSA-9b: CHROMIUM DETECTION (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.12.1 Site-Specific Considerations

Figure NPSA-9b-1 and Table NPSA-9b-1 depict the target contaminants for Site NPSA-9b. Boring 30 was included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9b (EBASCO, 1988a/RIC 88256R05).

2.12.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-9b are depicted in Figure NPSA-9b-1. Table NPSA-9b-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Based on available groundwater data from the first quater 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

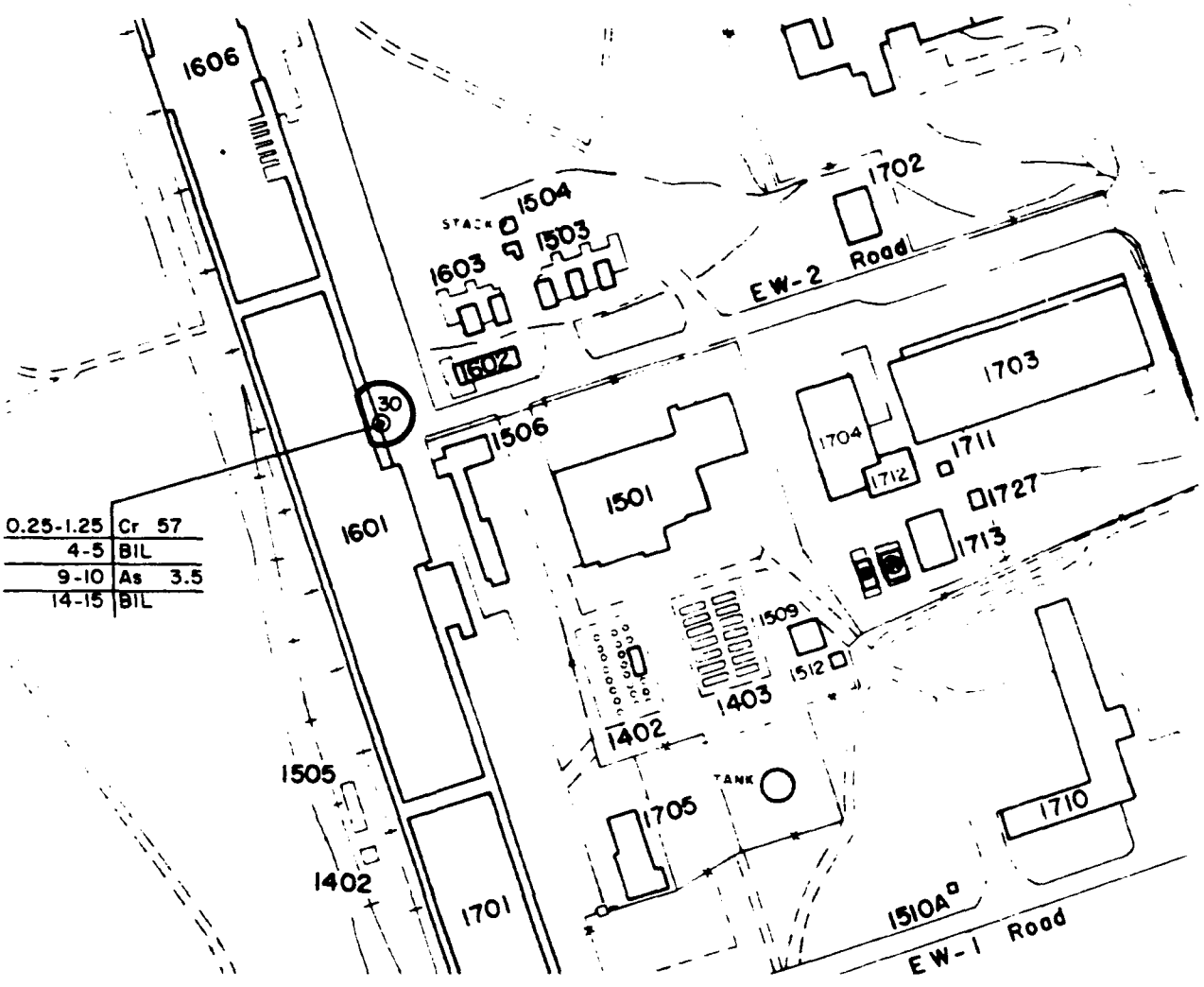
2.12.3 Site Exposure Summary

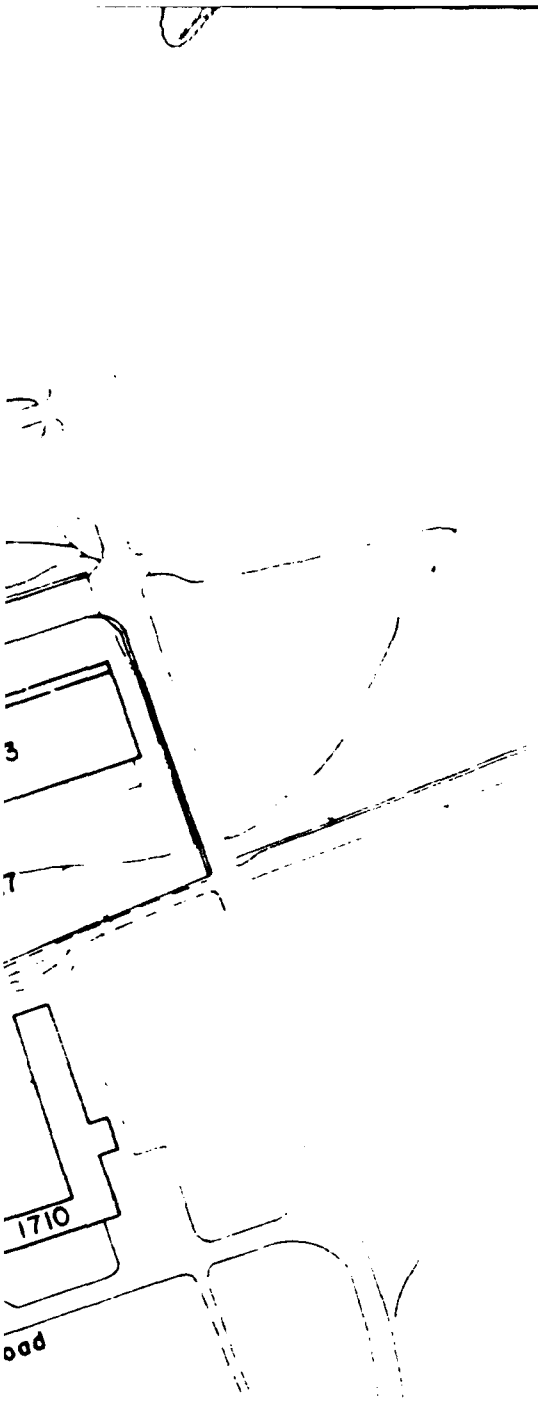
Tables NPSA-9b-2 through NPSA-9b-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Chromium	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors to the exceedence of the cumulative PPLVs. Site NPSA-9b is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).


1606
1504
STACK
1503
1603
1702
EW-2 Road
1602
30
1506
1703
1704
1711
1712
1727
1501
1601
1713
1509
1512
1403
1402
1505
TANK
1705
1710
1402
1701
1510A
EW-1 Road
0.25-1.25 Cr 57
4-5 BIL
9-10 As 3.5
14-15 BIL



Legend

30 ⊙ Phase I Boring

Site Boundary

Sample Interval (ft.) — 9-10 | Analyte: As 3.5 — Concentration (ug/g)

BIL - Below Indicator Level

As : Arsenic
Cr : Chromium

N

0 200 400
FEET

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9b-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-9b-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-9b

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Chromium	57	0.25-1.25	30	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

NPSA-9b-2

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	8.2E-01*	0.0E+00	8.2E-01*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-9b-3

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHROMIUM	6.9E+01	0.0E+00	6.9E+01	8.2E-01*	0.0E+00	8.2E-01*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-9b-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
CHROMIUM	8.8E+00	0.0E+00	8.8E+00	6.5E+00*	0.0E+00	6.5E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-9b-5

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
CHROMIUM	5.5E+01	0.0E+00	5.5E+01	1.0E+00*	0.0E+00	1.0E+00*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-9b-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
CHROMIUM	1.1E+00	0.0E+00	0.0E+00	1.1E+00	5.0E+01*	0.0E+00	5.0E+01*	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.13 SITE NPSA-9c: ZINC DETECTION (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.13.1 Site-Specific Considerations

Figure NPSA-9c-1 and Table NPSA-9c-1 depict the target contaminants for Site NPSA-9c. Boring 35/35B was included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9c (EBASCO, 1988a/RIC 88256R05).

2.13.2 Spatial Distribution of Measured Contaminant Concentrations

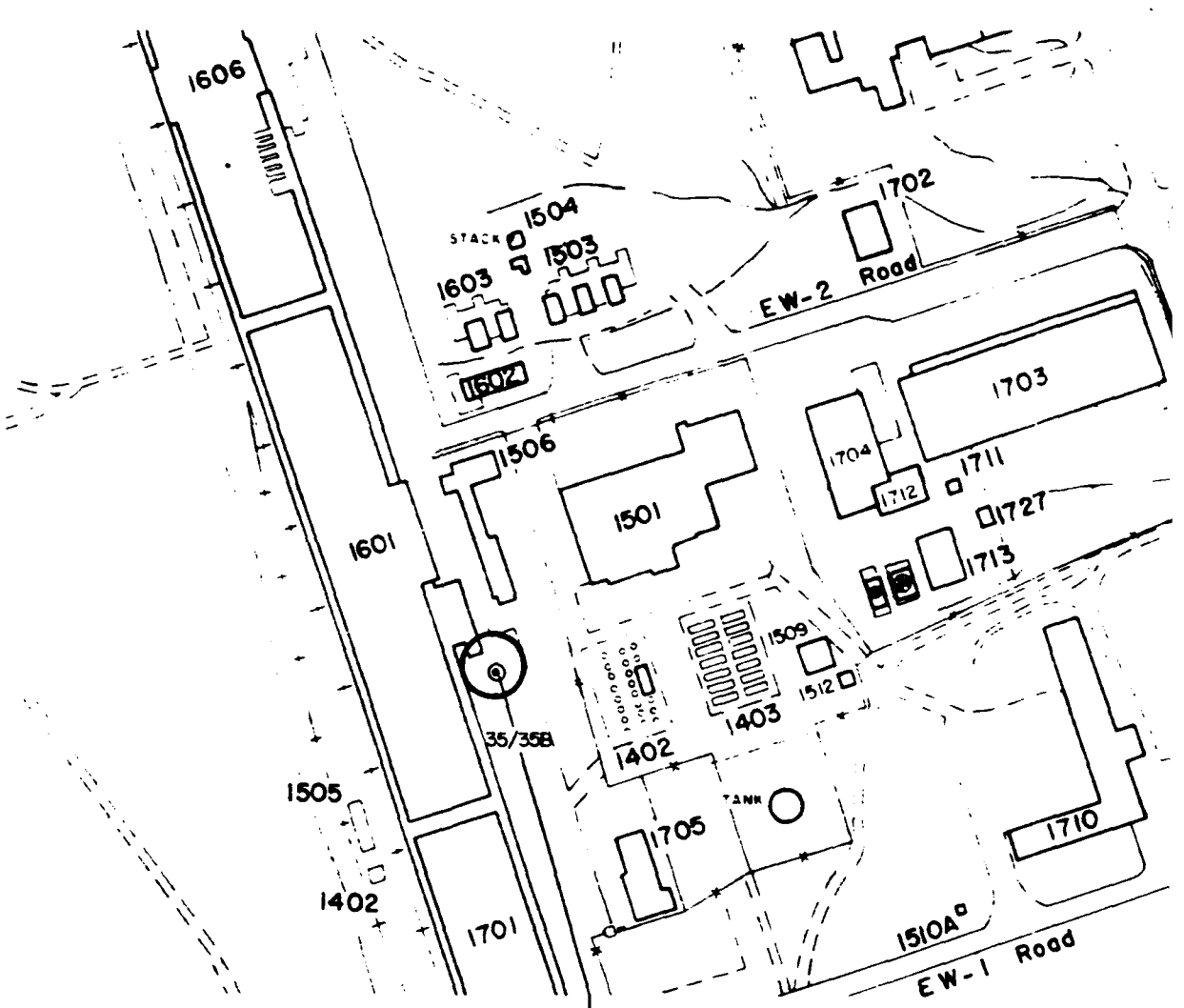
The locations and concentrations of the target contaminants that were detected in Site NPSA-9c are depicted in Figure NPSA-9c-1. Table NPSA-9c-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Based on available groundwater data from the first quarter 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

2.13.3 Site Exposure Summary

Tables NPSA-9c-2 through NPSA-9c-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
None	--	--	--	--	--

The results of the soil exposure summary indicate that there are no COCs. Site NPSA-9c is designated as a Priority 2 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).



0.3-1.3	BIL
4-5	As 5.6 Cr 31 Zn 85
9-10	Zn 62
14-15	BIL
19-20	As 3.0
29-30	BIL
39-40	BIL
49-50	As 9.5 Cu 20

Legend

35/
35B◎ Phase I Boring

☐ Site Boundary

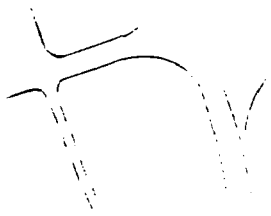
Sample Interval (ft.) — 4-5 | As 3.5 — Analyte; Concentration (ug/g)

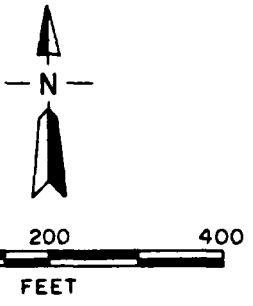
Bedrock Sample

BIL - Below Indicator Level

Note: For borings with 2 site ID numbers (e.g. 35/35B), two drilling methods were employed.

As : Arsenic
Cr : Chromium
Cu : Copper
Zn : Zinc





Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9c-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-9c-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-9c

Contaminant	Horizon 1			Horizon 2		
	Max. (ug/g)	Depth (ft)	Boring Number	Max. (ug/g)	Depth (ft)	Boring Number
Zinc	85	4-5	35/35B	--	--	--

NPSA	North Plants Study Area
Max.	Maximum
ug/g	microgram per gram
ft	foot/feet

NPSA-9c-2

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ZINC	2.0E+06	0.0E+00	2.0E+06	4.3E-05	0.0E+00	4.3E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9c-3

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ZINC	2.0E+06	0.0E+00	2.0E+06	4.3E-05	0.0E+00	4.3E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9c-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ZINC	1.1E+06	0.0E+00	1.1E+06	8.1E-05	0.0E+00	8.1E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9c-5

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
ZINC	7.8E+05	0.0E+00	7.8E+05	1.1E-04	0.0E+00	1.1E-04	0.0E+00

NPSA-9c-6
EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
INC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.1E-04	0.0E+00	6.1E-04	0.0E+00	0.0E+00

2.14 SITE NPSA-9d: BENZENE AND ZINC DETECTIONS (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05 and EBASCO, 1988b/RIC 88256R05A)

2.14.1 Site-Specific Considerations

Figure NPSA-9d-1 and Tables NPSA-9d-1 and NPSA-9d-2 depict the target contaminants for Site NPSA-9d. Boring 45 was included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9d (EBASCO, 1988a/RIC 88256R05).

2.14.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-9d are depicted in Figure NPSA-9d-1. Table NPSA-9d-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Table NPSA-9d-2 summarizes the maximum concentrations detected in groundwater together with the well number, location, sampling interval, and depth to groundwater.

2.14.3 Site Exposure Summary

Tables NPSA-9d-3 through NPSA-9d-7 present Draft PPLVs, EIs, and VEIs for each site contaminant. Since the depth to groundwater below Site NPSA-9d is greater than 10 ft the enclosed space vapor inhalation SPPPLV is included in the calculation of the cumulative quantity. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

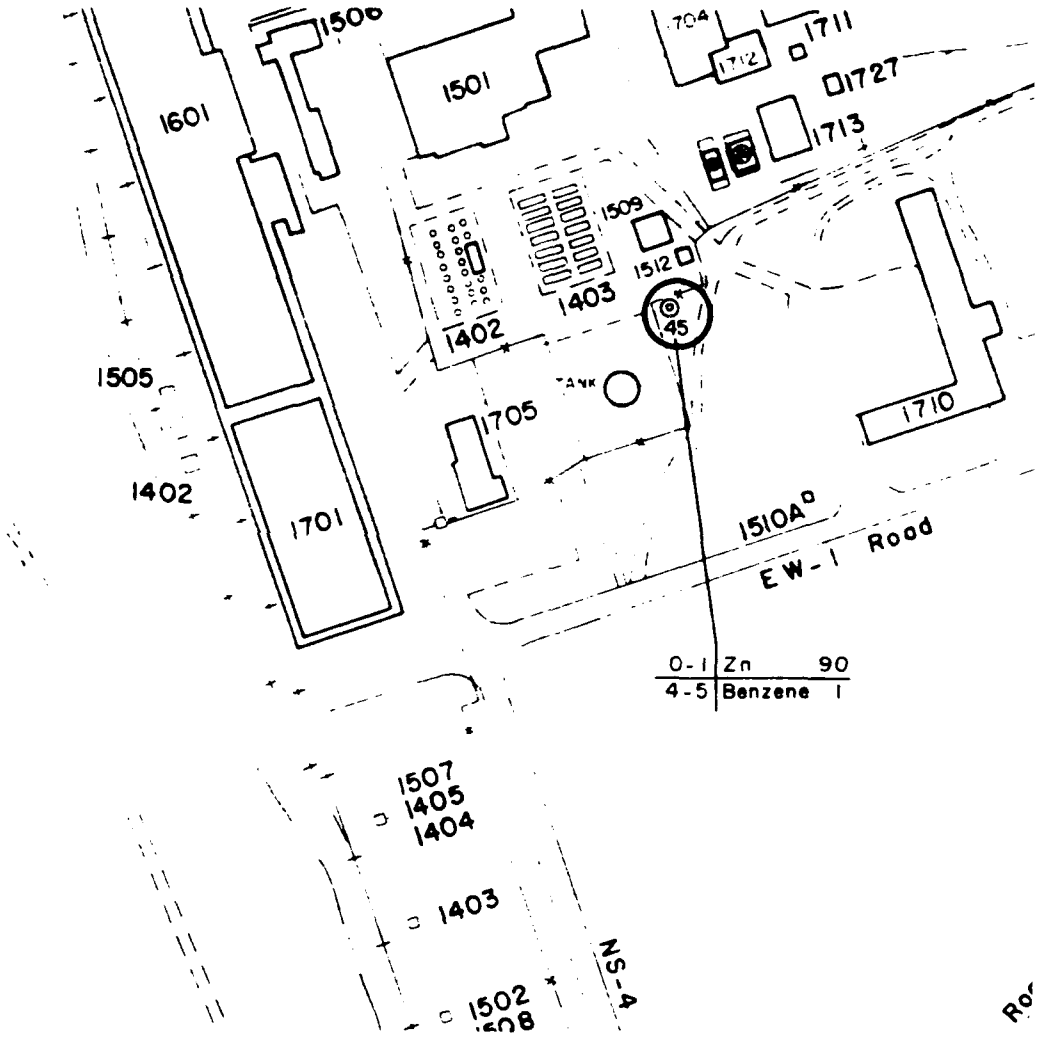
Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Benzene	--	--	--	Indirect	Indirect

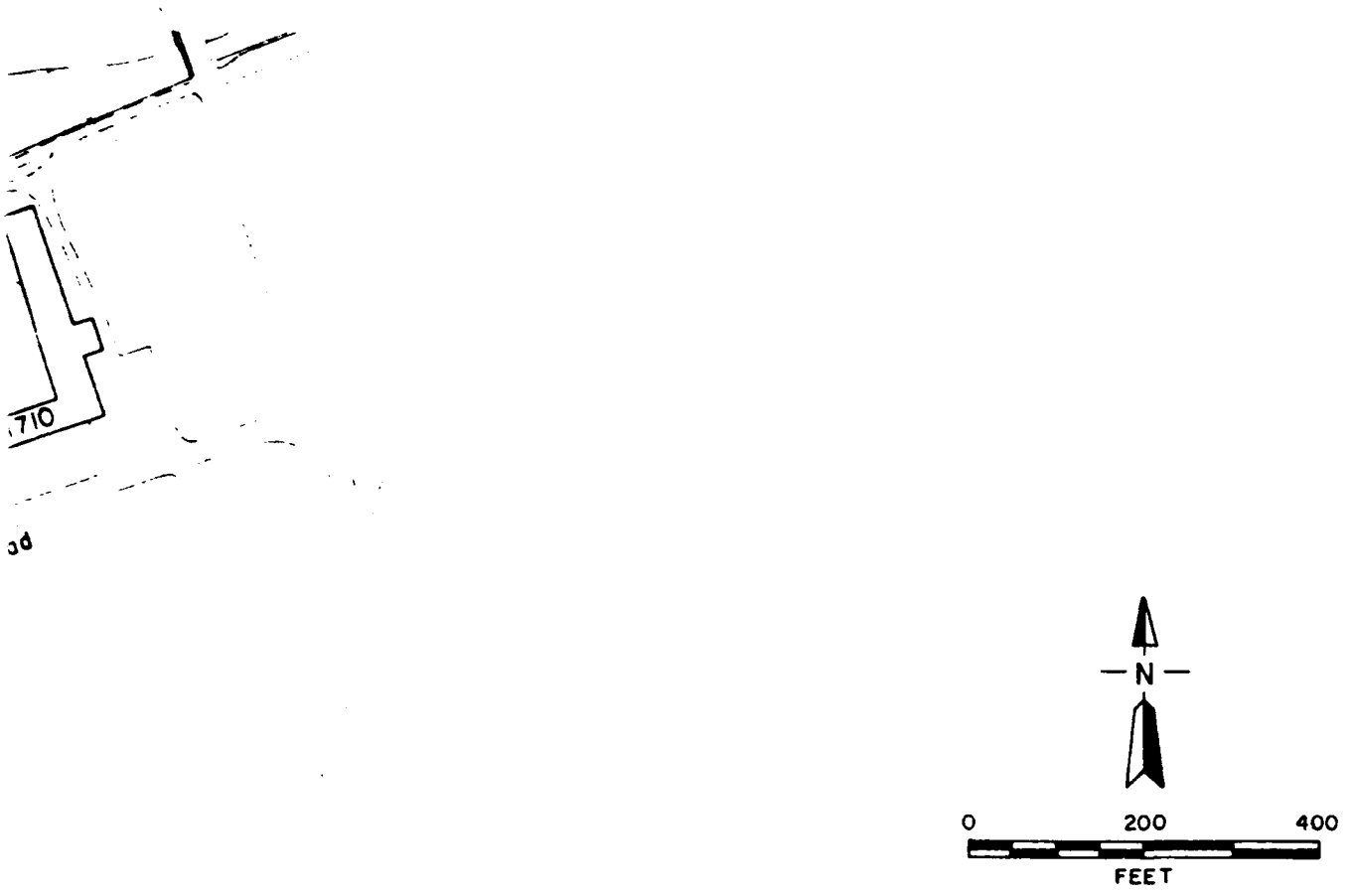
Note: Indirect exposure pathways include open and enclosed space vapor inhalation.

The results of the soil exposure summary indicate that exposure to contamination from the indirect pathways are the primary contributors to the exceedance of the cumulative PPLVs. Site NPSA-9d is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).

The following groundwater contaminants result in an unacceptable exposure due to vapor inhalation as indicated by a VEI value greater than 1:

- Carbon tetrachloride (enclosed)
- 1,1-Dichloroethylene (enclosed)


1500
1501
1601
1704
1711
1712
1727
1713
1509
1512
1403
1402
45
1505
TANK
1705
1710
1402
1701
1510A
EW-1 Road
0-1 Zn 90
4-5 Benzene 1
1507
1405
1404
1403
1502
NS-4



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9d-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-9d-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-9d

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
Benzene	1	4-5	45	1	4-5	45
Zinc	90	0-1	45	--	--	--

NPSA North Plants Study Area
Max. Maximum
ug/g microgram per gram
ft foot/feet

2-129

TABLE NPSA-9d-2

GROUNDWATER CONTAMINANT CONCENTRATIONS (UG/L)
FOR SITE NPSA-9d

AVERAGE SITE DEPTH TO GROUNDWATER: 34 Feet

CHEMICAL	CONCENTRATION MAXIMUM	LOCATION (WELL NUMBER)	SAMPLE DATE
1,1,1-TRICHLOROETHANE	2.5	25042	05/25/88
1,1-DICHLOROETHYLENE	8.9	25042	05/25/88
1,1-DICHLOROETHANE	1.7	25042	05/25/88
CARBON TETRACHLORIDE	65	25042	05/25/88
CHLOROFORM	470	25042	05/25/88
DIISOPROPYLMETHYL PHOSPHONATE	40	25042	05/25/88
TRICHLOROETHYLENE	100	25042	05/25/88

EACH VALUE PRESENTED IS THE MAXIMUM CONCENTRATION FOR THE LISTED ANALYTE FOR THE PERIOD March 17, 1987 TO February 28, 1989.
DATA SOURCE: DP ASSOCIATES, RMA Database, July 19, 1990

NPSA-9d-3

EXPOSURE EVALUATIONS FOR REGULATED VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	6.5E+04	8.5E+02	1.2E-03	1.5E-05	1.2E-03	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-11
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-11
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.4E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.0E-06
ZINC	2.0E+06	0.0E+00	2.0E+06	4.5E-05	0.0E+00	4.5E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9d-4

EXPOSURE EVALUATIONS FOR CASUAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	8.6E+02	6.5E+04	8.5E+02	1.2E-03	1.5E-05	1.2E-03	0.0E+00
CARBON TETRACHLORIDE	2.0E+02	0.0E+00	2.0E+02	0.0E+00	0.0E+00	0.0E+00	2.5E-05
CHLOROFORM	4.0E+03	0.0E+00	4.0E+03	0.0E+00	0.0E+00	0.0E+00	1.6E-06
1,1-DICHLOROETHANE	2.8E+02	0.0E+00	2.8E+02	0.0E+00	0.0E+00	0.0E+00	1.1E-11
1,1-DICHLOROETHYLENE	4.3E+01	0.0E+00	4.3E+01	0.0E+00	0.0E+00	0.0E+00	4.5E-05
DIISOPROPYLMETHYL PHOSPHONATE	6.6E+05	0.0E+00	6.6E+05	0.0E+00	0.0E+00	0.0E+00	2.0E-11
1,1,1-TRICHLOROETHANE	7.5E+05	0.0E+00	7.5E+05	0.0E+00	0.0E+00	0.0E+00	3.4E-11
TRICHLOROETHYLENE	2.3E+03	0.0E+00	2.3E+03	0.0E+00	0.0E+00	0.0E+00	2.0E-06
ZINC	2.0E+06	0.0E+00	2.0E+06	4.5E-05	0.0E+00	4.5E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9d-5

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
BENZENE	1.2E+02	1.0E+04	1.2E+02	8.4E-03	9.9E-05	8.5E-03	0.0E+00
CARBON TETRACHLORIDE	2.7E+01	0.0E+00	2.7E+01	0.0E+00	0.0E+00	0.0E+00	3.8E-04
CHLOROFORM	5.6E+02	0.0E+00	5.6E+02	0.0E+00	0.0E+00	0.0E+00	2.4E-05
1,1-DICHLOROETHANE	3.9E+01	0.0E+00	3.9E+01	0.0E+00	0.0E+00	0.0E+00	1.6E-10
1,1-DICHLOROETHYLENE	5.9E+00	0.0E+00	5.9E+00	0.0E+00	0.0E+00	0.0E+00	6.8E-04
DIISOPROPYLMETHYL PHOSPHONATE	2.8E+05	0.0E+00	2.8E+05	0.0E+00	0.0E+00	0.0E+00	1.3E-10
1,1,1-TRICHLOROETHANE	3.2E+05	0.0E+00	3.2E+05	0.0E+00	0.0E+00	0.0E+00	2.2E-10
TRICHLOROETHYLENE	3.2E+02	0.0E+00	3.2E+02	0.0E+00	0.0E+00	0.0E+00	3.0E-05
ZINC	1.1E+06	0.0E+00	1.1E+06	8.6E-05	0.0E+00	8.6E-05	0.0E+00

If the PPLV value indicated is greater than 1.00E+06 the calculations imply that the contaminant does not pose unacceptable chronic exposure through the exposure pathway considered, even in its pure form.

NPSA-9d-6

EXPOSURE EVALUATIONS FOR COMMERCIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI ENC
BENZENE	1.1E+03	6.4E-01	6.4E-01	9.2E-04	1.6E+00*	1.6E+00*	0.0E+00
CARBON TETRACHLORIDE	2.5E+02	0.0E+00	2.5E+02	0.0E+00	0.0E+00	0.0E+00	1.8E+00
CHLOROFORM	5.1E+03	0.0E+00	5.1E+03	0.0E+00	0.0E+00	0.0E+00	1.1E-01
1,1-DICHLOROETHANE	3.6E+02	0.0E+00	3.6E+02	0.0E+00	0.0E+00	0.0E+00	7.7E-07
1,1-DICHLOROETHYLENE	5.4E+01	0.0E+00	5.4E+01	0.0E+00	0.0E+00	0.0E+00	3.2E+00
DIISOPROPYLMETHYL PHOSPHONATE	3.7E+05	0.0E+00	3.7E+05	0.0E+00	0.0E+00	0.0E+00	4.4E-06
1,1,1-TRICHLOROETHANE	4.2E+05	0.0E+00	4.2E+05	0.0E+00	0.0E+00	0.0E+00	7.3E-06
TRICHLOROETHYLENE	2.9E+03	0.0E+00	2.9E+03	0.0E+00	0.0E+00	0.0E+00	1.4E-01
ZINC	7.8E+05	0.0E+00	7.8E+05	1.2E-04	0.0E+00	1.2E-04	0.0E+00

*: EI is equal to or exceeds 1.0E-01

NPSA-9d-7

EXPOSURE EVALUATIONS FOR INDUSTRIAL WORKERS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT OSVI (mg/kg)	INDIRECT ESVI (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN	VEI ENC
BENZENE	6.7E+01	8.7E+03	6.4E-01	6.3E-01	1.5E-02	1.6E+00*	1.6E+00*	0.0E+00	0.0E+00
CARBON TETRACHLORIDE	1.5E+01	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0E+00	0.0E+00	1.9E-04	5.5E+00
CHLOROFORM	3.1E+02	0.0E+00	0.0E+00	3.1E+02	0.0E+00	0.0E+00	0.0E+00	1.2E-05	3.4E-01
1,1-DICHLOROETHANE	2.3E+01	0.0E+00	0.0E+00	2.3E+01	0.0E+00	0.0E+00	0.0E+00	8.0E-11	2.3E-06
1,1-DICHLOROETHYLENE	3.2E+00	0.0E+00	0.0E+00	3.2E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-04	9.7E+00
DIISOPROPYLMETHYL PHOSPHONATE	6.8E+04	0.0E+00	0.0E+00	6.8E+04	0.0E+00	0.0E+00	0.0E+00	1.5E-10	4.4E-06
1,1,1-TRICHLOROETHANE	7.8E+04	0.0E+00	0.0E+00	7.8E+04	0.0E+00	0.0E+00	0.0E+00	2.5E-10	7.3E-06
TRICHLOROETHYLENE	1.8E+02	0.0E+00	0.0E+00	1.8E+02	0.0E+00	0.0E+00	0.0E+00	1.5E-05	4.2E-01
ZINC	1.4E+05	0.0E+00	0.0E+00	1.4E+05	6.5E-04	0.0E+00	6.5E-04	0.0E+00	0.0E+00

*: EI is equal to or exceeds 1.0E-01

2.15 SITE NPSA-9e: RAILROAD TRACKS (formerly North Plants Complex; EBASCO, 1988a/RIC 88256R05)

2.15.1 Site-Specific Considerations

Figure NPSA-9e-1 and Table NPSA-9e-1 depict the target contaminants for Site NPSA-9e. Boring 48 was included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9e (EBASCO, 1988a/RIC 88256R05).

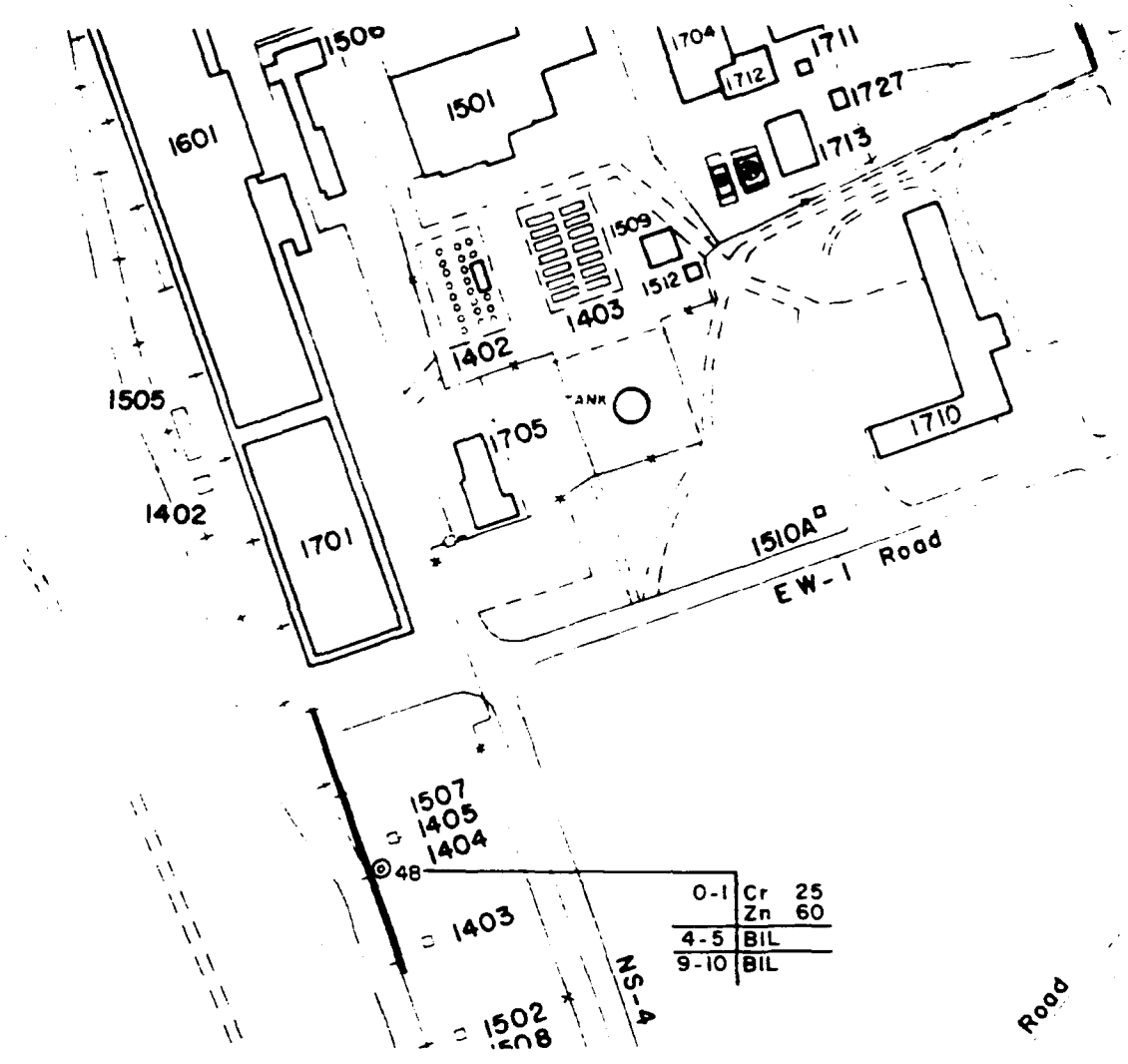
2.15.2 Spatial Distribution of Measured Contaminant Concentrations

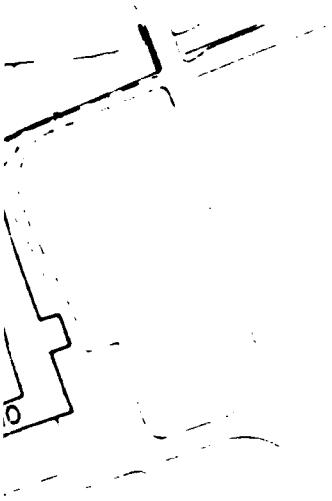
The locations and concentrations of the target contaminants that were detected in Site NPSA-9e are depicted in Figure NPSA-9e-1. 2-Butoxyethanol, occurring in Boring 48 (0-1 ft) was not included in the figure since it was not considered a target contaminant during the Phase I and Phase II investigations. Although not shown in the figure, 2-Butoxyethanol was included in the NPSA SAR and in this exposure assessment because it passed through the screening process performed in the RMA Chemical Index (EBASCO, 1988c/RIC 88357R01).

Table NPSA-9e-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury and CRLs for organic contaminants from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. Table NPSA-9e-1 shows that no target contaminants were found above the indicator level. No data were included for ICP metals, arsenic, and mercury in Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). Based on available groundwater data from the first quarter 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

2.15.3 Site Exposure Summary

Only nontarget soil contaminants are shown on Table NPSA-9e-1. Since nontarget contaminants (excluding 1,1,2,2-tetrachloroethane) were not assessed using the PPLV methodology, no COCs were identified for this site. Site NPSA-9e is designated as a Priority 2 site.


1500
1501
1704
1711
1712
1727
1601
1713
1509
1512
1403
1402
1505
1705
1710
1402
1701
1510A
EW-1 Road
1507
1405
1404
48
1403
1502
NS-4
0-1 Cr 25
Zn 60
4-5 BIL
9-10 BIL
Road



Road

Legend

48 ◉ Phase I Boring

Site Boundary

Sample Interval (ft.) — 0-1 | Cr — Analyte — 25 — Concentration (ug/g)

BIL - Below Indicator Level

Cr : Chromium
Zn : Zinc

N

0 200 400

FEET

Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9e-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

TABLE NPSA-9e-1
SOIL CONTAMINANT CONCENTRATIONS
FOR SITE NPSA-9e

Contaminant	Horizon 1 Max. (ug/g)	Horizon 1 Depth (ft)	Horizon 1 Boring Number	Horizon 2 Max. (ug/g)	Horizon 2 Depth (ft)	Horizon 2 Boring Number
2-Butoxyethanol[1/]	2.0	0-1	48	2.0	0-1	48

1/ Nontarget contaminant. Refer to the exposure assessment nontarget screen in Appendix A.

NPSA	North Plants Study Area
Max.	Maximum
ug/g	microgram per gram
ft	foot/feet

2.16 SITE NPSA-9f: ARSENIC DETECTION (formerly Section 25 - Nonsource Area; ESE, 1988A/RIC 88063R09)

2.16.1 Site-Specific Considerations

Figure NPSA-9f-1 and Table NPSA-9f-1 depict the target contaminants for Site NPSA-9f. Boring 5121 was included in this exposure assessment, consistent with the North Plants SAR. According to the site history, no chemicals from the RMA target contaminant list were suspected to be present in Site NPSA-9f (ESE, 1988a/RIC 88063R09).

2.16.2 Spatial Distribution of Measured Contaminant Concentrations

The locations and concentrations of the target contaminants that were detected in Site NPSA-9f are depicted in Figure NPSA-9f-1. Table NPSA-9f-1 summarizes the maximum concentrations of contaminants measured in soil above indicator levels for the ICP metals, arsenic, and mercury from the Phase I and Phase II investigations. The boring number and depth where the maximum value was observed are shown. No data were included for ICP metals, arsenic, and mercury for Horizon 2 because direct soil exposure below 10 ft is assumed to be negligible (see Volume VI-A). No organic contaminants were detected at this location. Based on available groundwater data from the first quarter 1987 to the first quarter 1989 sampling period, no evidence of groundwater contamination beneath this site was found (see Volume VI-A).

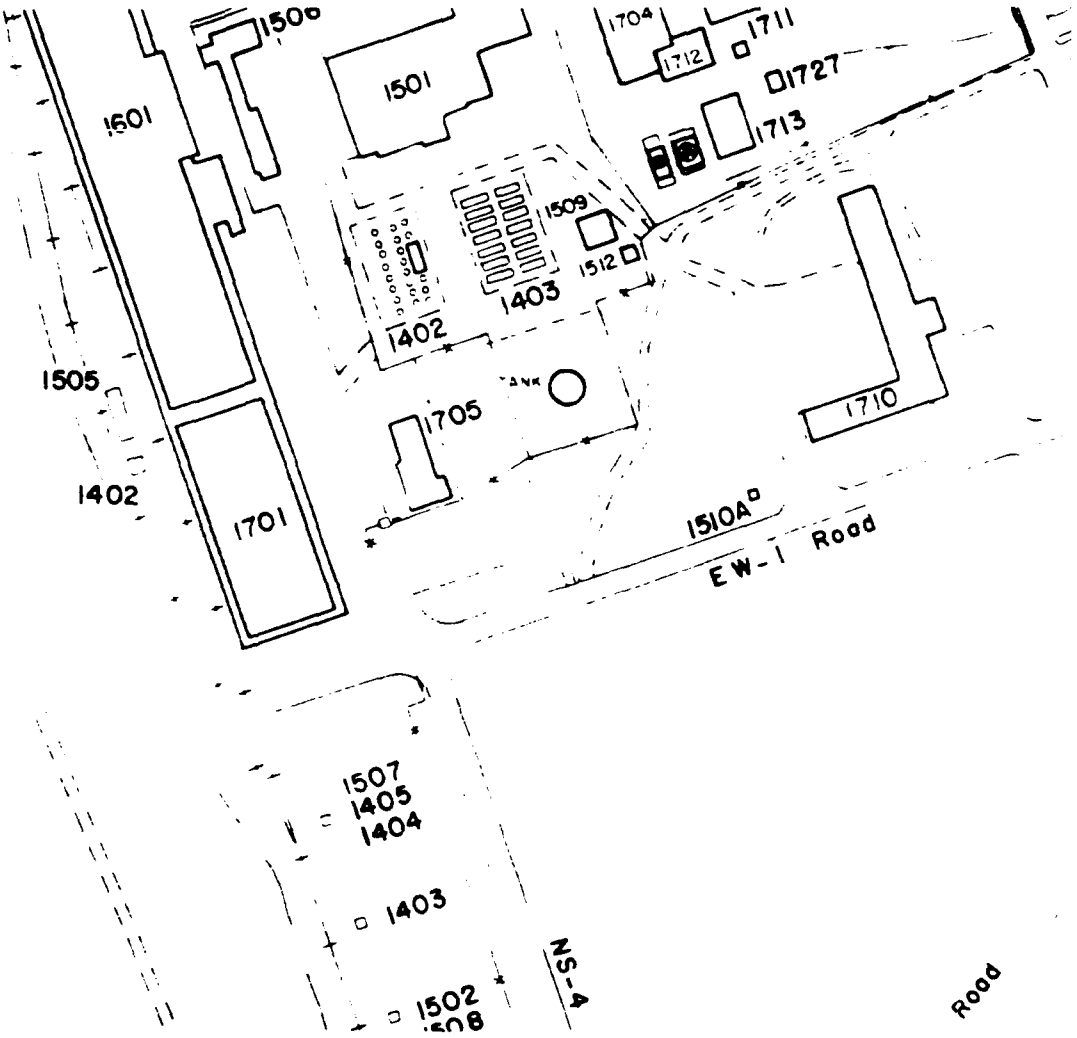
2.16.3 Site Exposure Summary

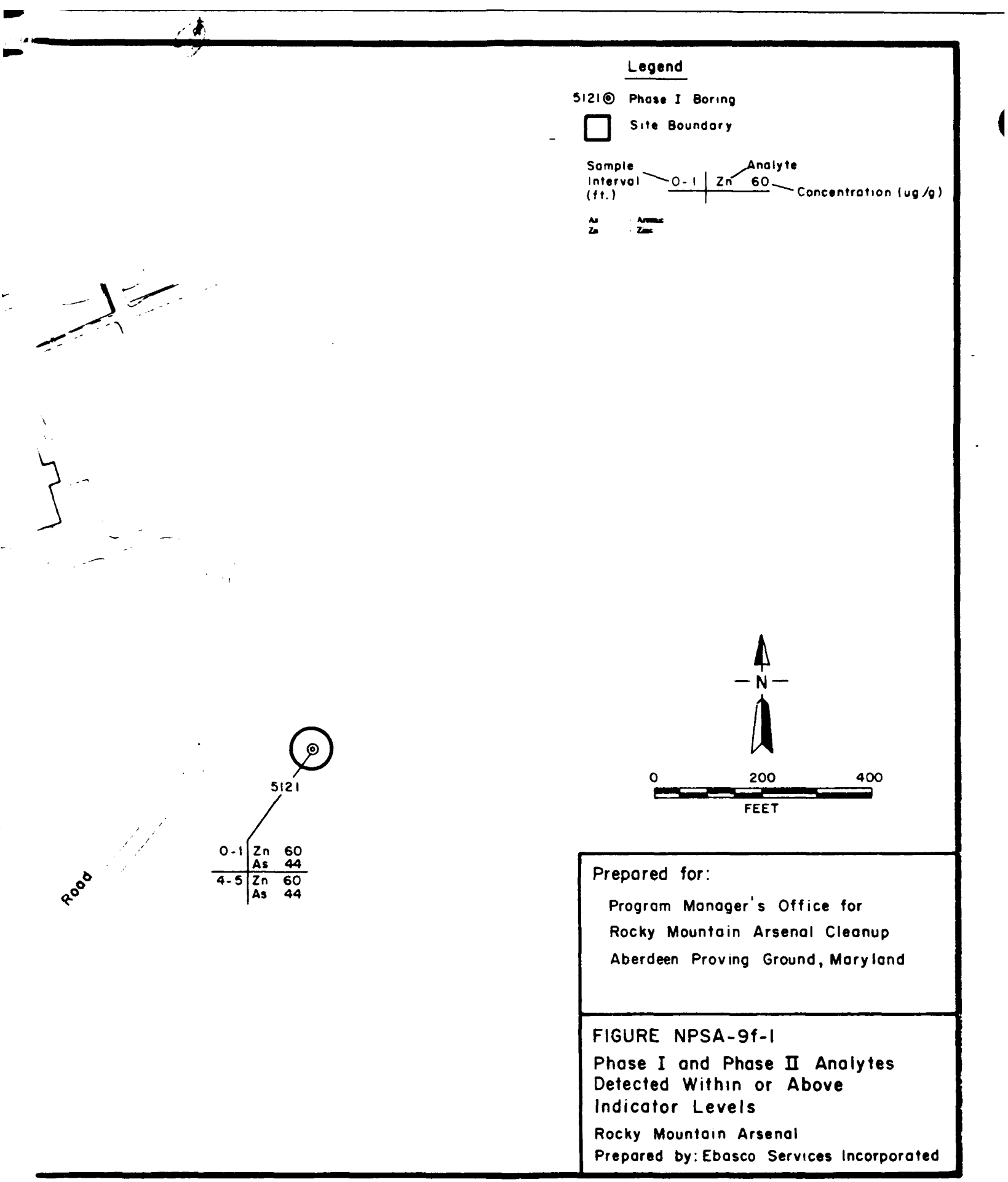
Tables NPSA-9f-2 through NPSA-9f-6 present Draft PPLVs and EIs for each site contaminant. The COCs are summarized below for each exposed population and with the critical exposure pathway identified.

Contaminants of Concern	Regulated Visitor	Casual Visitor	Recreational Visitor	Commercial Worker	Industrial Worker
Arsenic	Direct	Direct	Direct	Direct	Direct

Note: Direct exposure pathways for soils include soil ingestion, suspended particulate inhalation, and dermal contact.

The results of the soil exposure summary indicate that exposure to contamination from the direct pathways are the primary contributors of the exceedance of the cumulative PPLVs. Site NPSA-9f is designated as a Priority 1 site, based on the most sensitive exposed population PPLV (i.e., the industrial worker).


1500
1501
1601
1704
1711
1712
1727
1713
1509
1512
1403
1402
1505
1705
TANK
1710
1402
1701
1510A
EW-1 Road
1507
1405
1404
1403
1502
NS-4
Road



Prepared for:

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE NPSA-9f-1

Phase I and Phase II Analytes Detected Within or Above Indicator Levels

Rocky Mountain Arsenal

Prepared by: Ebasco Services Incorporated

NPSA-9f-4

EXPOSURE EVALUATIONS FOR RECREATIONAL VISITORS

CONTAMINANT	DIRECT PPLV (mg/kg)	INDIRECT PPLV (mg/kg)	CUMULATIVE PPLV (mg/kg)	DIRECT EI	INDIRECT EI	CUMULATIVE EI	VEI OPN
ARSENIC	3.9E+00	0.0E+00	3.9E+00	1.1E+01*	0.0E+00	1.1E+01*	0.0E+00

*: EI is equal to or exceeds 1.0E-01

3.0 STUDY AREA EXPOSURE SUMMARY

The exposure assessment results for the NPSA at RMA are summarized in Table 3-1. Of the 16 sites that were evaluated, 10 sites were designated as Priority 1 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Chemical Sewer System (NPSA-1)
- Tank Farm (NPSA-2)
- GB Manufacturing Area (NPSA-3)
- Fuze and Detonator Magazine (NPSA-4)
- Special Weapons Plant (NPSA-5)
- Underground Spill Area (NPSA-6)
- Drainage Ditch (NPSA-8c)
- Chromium Detection (NPSA-9b)
- Benzene and Zinc Detections (NPSA-9d)
- Arsenic Detection (NPSA-9f)

Six sites were designated as Priority 2 sites based on the most sensitive exposed population PPLV (i.e., the industrial worker). These include:

- Surface Spill Area (NPSA-7)
- Drainage Ditch (NPSA-8a)
- Drainage Ditch (NPSA-8b)
- Railroad Tracks (NPSA-9a)
- Zinc Detection (NPSA-9c)
- Railroad Tracks (NPSA-9e)

The COCs in soils (i.e., those displaying an EI greater than 0.1) for the NPSA, based on the most sensitive exposed population PPLV (i.e., the industrial worker), are:

- Aldrin
- Benzene
- Chloroacetic acid
- Chloroform
- Dieldrin

- Tetrachloroethylene
- Arsenic
- Cadmium
- Chromium

The number of exceedances of each contaminant is summarized in Table 3-1.

The COSs in groundwater (i.e., those with a VEI greater than 1) for the NPSA are:

- Carbon tetrachloride
- 1,1-Dichloroethylene

4.0 REFERENCES

RIC 88256R05

EBASCO (Ebasco Services Incorporated). 1988a. Final Phase I Contamination Assessment Report. North Plants Complex. Version 3.2. September 1988. Task No. 42 - North Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88256R05A

EBASCO. 1988b. Final Phase II Data Addendum. North Plants Complex. Version 3.2. November 1988. Task No. 42/45/48 - North Plants. Contract No. DAAK11-84-D-0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88357R01

EBASCO. 1988c. Proposed Final Rocky Mountain Arsenal Chemical Index, Volumes I-II. May 1988. Contract No. DAAK11-84-D0017. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 89166R05

EBASCO. 1989a. Final Remedial Investigation Report. Volume IX. North Plants Study Area. Version 3.3. July 1989. Contract No. DAAA15-88-D-0024. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88063R09

ESE (Environmental Science and Engineering, Inc.). 1988a. Final Phase I Contamination Assessment Report. Section 25 - Nonsource Area. Version 3.2. March 1988. Task No. 14 - Army Sites North. Contract No. DAAK11-84-D-0016. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

RIC 88063R09A

ESE. 1988b. Final Phase II Data Addendum. Section 25 - Nonsource Area. September 1988. Contract No. DAAK11-84-D-0016. Prepared for: U.S. Army Program Manager's Office for RMA Contamination Cleanup.

APPENDIX A
NONTARGET SCREENING

NONTARGET SCREENING

A number of nontarget contaminants were originally identified through a screen (i.e., toxicity, concentration, frequency of occurrence) of the nontarget fraction of the Phases I and II RI data as part of the RMA Chemical Index (EBASCO, 1988c/RIC88357R01). These contaminants were carried through to the exposure assessment where an additional screening was performed to determine whether PPLVs should be developed for each of the site-specific nontarget contaminants. Development of PPLVs for these contaminants was based on four screening criteria, namely, frequency of occurrence, similarity of the nontarget concentration to that of target contaminants, suspicion that the detection was a laboratory contaminant, and co-occurrence of nontargets with targets in Arsenal soils (see Volume VI-A, Section 2.2.3.1).

The results of the nontarget evaluations for each site of North Plants Study Area, their screening parameters, and the decision to further consider or reject them, are presented in Table A-1.